COMMODORE USERS

Ahoy!

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Ahoy!

CONTENTS

DEPARTMENTS

FEATURES

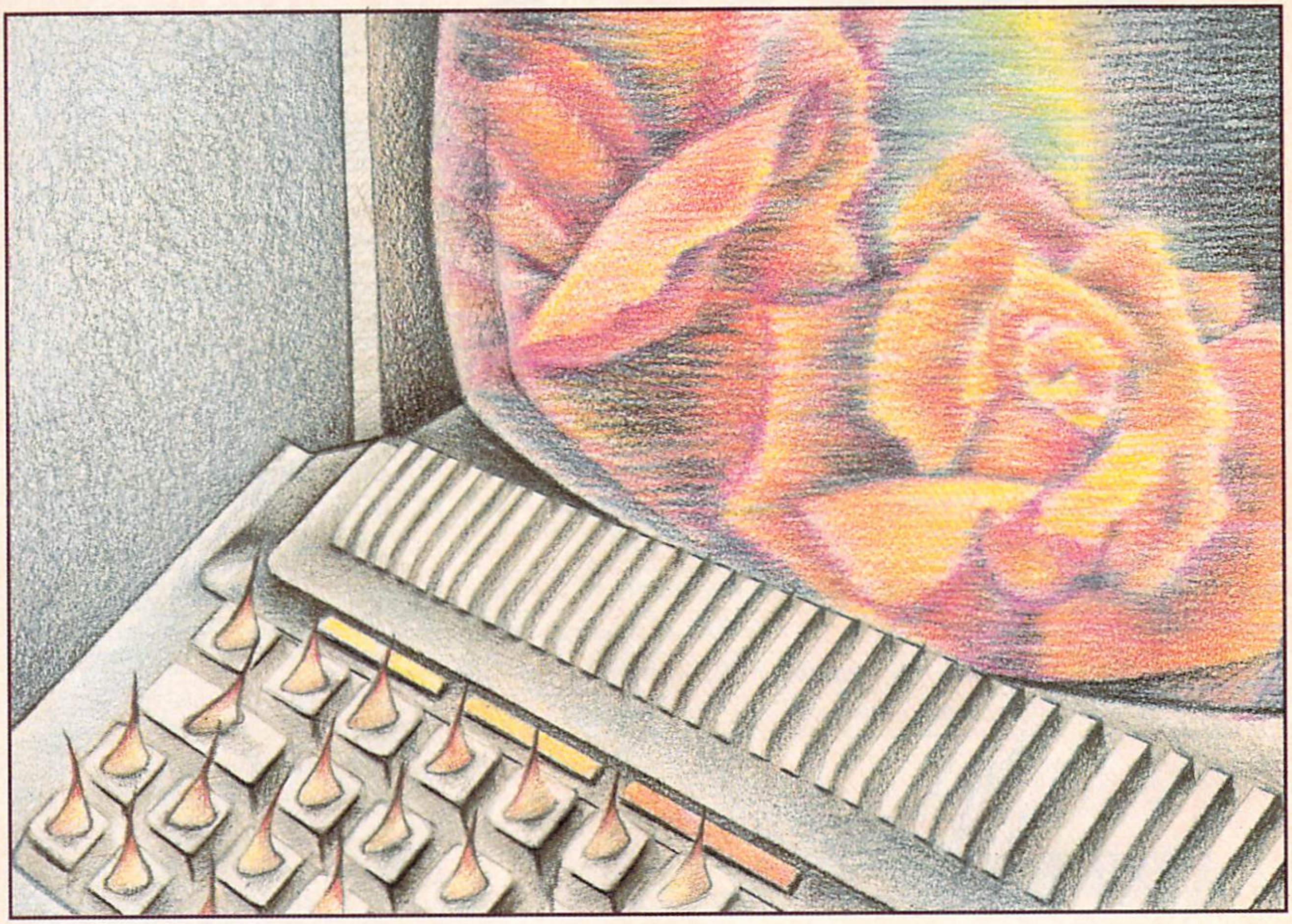
PROGRAMS

Cover Illustration by James Regan
(Inside illustrations by James Regan, Kat Reviaska, Mark Levine)

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EDITORIAL



© June Hong 1984

by Raymond Z. Gallun

The Biggest Game—Living—has always had its hazards and doubts. But it should be especially exciting nowadays, while technological improvements keep rushing into our lives.

So, if we buy a computer or other electronic device today, will a less costly, more compact and more efficient successor of broadened capability come out next season? And can we even be sure that there will be somebody around to service our purchase if trouble develops? *Caveat emptor,* buyer beware, is an old and wise saying.

We aren't stupid. Before we spend any money, we find out all we can about what we can get right now, and about how much better we *may* do a little later on. We bone up on whatever is new to us. We consult technical literature and advertising. We watch salespeople demonstrate products and ask them questions. Maybe we are allowed to play with the equipment ourselves. And, to get the real lowdown, we talk to friends who are further advanced in the kind of experience we need. This educating process is a *must,* because we don't care to be left far behind among remarkable developments that are already factual, and widening rapidly. Not only our job-effectiveness is involved, but the richness and extent of our being.

Meanwhile, sensibly and cautiously though, maybe we wait. But if we are waiting for our world to stabilize enough so that we will get something exactly right for our needs, that may never happen!

So we are in a bind of problems. Mightn't we even be stuck with a hastily designed throw-together, made of uncertain components, and meant to make a fast buck in a hurried market? Besides, isn't there the continuous, haunting shadow of obsolescence that we keep hearing about? Still, can we continue to hold back like non-participant bystanders, while others go beyond us in actual, firsthand acquaintance with the tools and progressions of our era, that rise like a bewildering flood around us?. . . There is the pathetic cartoon of a man left fiddling in enraged in-

comprehension at a sleek, arcane piece of equipment that has gone sullen or crazy on him, making him feel suckered for ever trusting such things!... When he should be getting good use, and having fun, too!

Of course our situation is not truly *that* bad—nor that hurried. Indeed we *should* get with present and coming realities, since they are part of where and what we are, and where we are headed. No, we can't all be experts in *everything,* maybe not even in anything—nowadays—there is just too much. But we can certainly acclimate enough to get along in and enjoy the gifts of our expanding universe.

For generations we in the U.S. have been looked on as a nation of tinkerers; and just about as validly, this name extends far and wide elsewhere. How many interested people, young and old, have grubbed with eager minds and greasy fingers into the innards of cars, or chased down and fixed the glitches in radios and TV sets? Not so many of us, perhaps, are actually the grimy-mitt type; but we do have our better-informed companions.

Historically, we've had a long and not entirely smooth acquaintance with the automobile industry. We've had our knowledgeable complaints, and the manufacturers—collections of individuals not so different from ourselves—have usually tried to respond intelligently, as they had better do, for their own economics. Because, though cars have long since become a necessity, not just a luxury, if we don't like what is offered at one source, there are plenty of others to go to, even if some of them are across oceans.

With automobiles, the yearly-model idea has worked out quite well, as has the trade-in system—particularly for those customers who worry about driving a vehicle that is a bit out of date—if the extra cost doesn't bother them. Guarantees and car-servicing facilities, though not always cussword-free, have been workably around for seeming ages.

Electronic devices are already as essential and necessary to our modern way of life as the automobile, and will surely become more so. They will even replace cars in some respects. Why commute miles every day, when, with the increase in communications potential, we might stay comfortably at home, and still be at our workplace, able to see, hear, and talk to our co-workers, and construct plans and diagrams together, since our contact could include remote manipulators?

Here, why shouldn't the electronics firms adopt more of the time-tested practices of the car makers in their contacts with the interested, product-wise, and—they hope—buying public. I expect they're trying, as they must. Though, being composed of folks like the rest of us, maybe they are also somewhat out of phase with all the rapid extensions within their own field—past fibre-optics, sonics, medical and industrial tomography, laser technology etc., and onward into photonics, artificial intelligence in computers, and further intrusions into space, possibly to include transmission of electricity down to earth from solar power stations in orbit before very long. And who can say what else? So, perhaps in the scramble, they're experiencing a lag and difficulties in gathering the personnel and other means needed for more evenly handling the problems and hesitations of their customers, actual and potential, such as servicing, ready attention, and reasonable help. We wish them full success in these matters too!

Further, I have the feeling that, in the rush of events, the bugaboo of obsolescence has been overplayed. It's partly myth. Where *quality* is present, it doesn't happen all that fast.

Examples: I have a little tape-recorder, a Califone, all of twelve years old. It still performs beautifully. It's a couple of pounds heavier than a current equivalent, but carrying it around doesn't break my arm. I don't remember its price, but even considering the higher buying-power of the dollar back then, I hardly think it was exorbitant... Also, I have a color TV with remote-control. It's even older. It has never been serviced. Two of its channels still work as well as ever. So it still functions as a second set in my household.

Yes—*quality* of design and workmanship, and effective quality-control of all component parts, remain a large factor in the lasting effectiveness of almost any artifact, as both shrewd customer and wise manufacturer should not forget. It is an important sales point. Nor do high price and quality necessarily go together.

There are folks who have sought out old vintage cars abandoned in cobwebby sheds, and have struggled to bring them back to "mint condition." Is this hobby based solely on nostalgia, or is there also the attraction of firm old machinery and metal, carefully crafted?

Out of attics have come ancient phonograph records. Sure, the tones that can be drawn from them are somewhat scratchy and fuzzy; the technology that produced those recordings is now vastly obsolete; still those discs are not worthless, since how, without their original impressions, could we know what great singing voices such as Enrico Caruso's sounded like at all?

Continued on page 98

VIEW FROM THE BRIDGE

Word processing. What aspect of microcomputing could rank higher in importance, especially with writers and editors such as ourselves? Yet we've waited until this, our eighth issue, to give C-64 word processors the kind of exhaustive treatment we've already afforded spreadsheets (May) and databases (July). Why did it take so long? Because the subject is so important, to writers and editors and computer users of every occupation, that we wanted to take the time to cover it more completely and more accurately than any Commodore publication has done to date. And we've done exactly that.

Sanjiva Nath, co-author of the *Commodore 64 Software Buyer's Guide,* explains the uses and functions of a word processing program, and how to select the one that best fits your needs, in *In Search of a Word Processor.* (Turn to page 19.) Sharing pages with Sanjiva's piece are the results of a survey conducted by Richard Herring, who hit up the manufacturers of 47 word processors with an extensive list of questions about their products. Answers from the 37 who replied are listed. As for the individuals at the other 10 who threw our survey in the wastebasket: we wouldn't show this magazine to the boss if we were you! (Turn to page 20.)

We're once again honored to feature a guest editorial by Raymond Gallun, a science fiction writer of note since 1929. (Turn to page 4.)

Is *Computational Wizardry* about the work of a 14th-century alchemist? No—a 17th-century mathematician. In addition to this latest *Rupert Report* (turn to page 35), Dale unleashes a host of new *Commodares.* (Turn to page 61.)

Why, asks Orson Scott Card, are there so few good word games available? He provides one, and teaches you to program one that's even better, in *What Are Your Words Worth?* (Turn to page 15.)

Other programs in this issue include Bob Lloret's *Micro Minder,* an electronic calendar that can help even the busy C-64 owner keep his appointments in order (turn to page 13); *Directory Assistance,* which puts your disk directories into a useable hard copy format (turn to page 39); and *The Terrible Twins,* a game just too silly to describe in the space we have left (turn to page 47).

There's a lot more inside, but we'll let you have the fun of finding out about it for yourself. We will say one more thing: for those of you who've been pleading for us to put each issue's program on disk, see the announcement in our September issue!

—David Allikas

PROGRAM CORRECTION

Our apologies: the C-64 version of *Post Time* (June *Ahoy!*) contained several errors. The SHIFTed asterisks in lines 10-55 should all be Commodore asterisks, and lines 130 and 1320 should be corrected to read as follows:

```
130 PRINT "{RV}{CU} **C*C*C**  P
O S T  T I M E{RV} **C**C***  "

1320 IF H(I)=WIN(1) THEN AMT(I)=I
NT(BET(I)*OD(1)/3):GOTO 1360
```

SCUTTLEBUTT

NEW GRAPHICS, EDUCATION, AND WORD PROCESSING PROGRAMS • COLOR MONITOR • CRT IMAGING OUTFIT • BATTERY BACK-UP • SCIENCE SIMULATIONS • NEW VIC AND 64 GAMES • LOW-COST LETTER-QUALITY PRINTER • COMMODORE HOUSECLEANING

COMMODORE: MORE ROOM AT THE TOP

The managerial exodus from Commodore International continues. It began in January with the resignation of founder/president Jack Tramiel, followed by the departure of the company's acting US president, marketing vice president, and other high-level personnel. This May, eight more executives departed, including finance vice president Bernhard Witter, US vice president of manufacturing and assembly Gregg Pratt, Taro Tokau, vice president of the Japan unit, and Sam Tramiel, general manager of Japan operations (and son of the former CEO).

The Wall Street Journal quoted president Marshall F. Smith (who would not indicate whether or not the eight left voluntarily) as saying that the changes have resulted in a "streamlining" and a "tightening up" of the organization. But the *Journal* also quotes an insider who avers that the departures were not Commodore's idea. "These people are bailing out—that's why it's in every department," said the source. "They're disenchanted with new management. It doesn't listen to the younger managers, and these guys contributed very heavily to the company."

Despite undeniable internal turmoil, Commodore continues to move toward capturing an even larger share of the microcomputer market. This issue goes to press days before June's Consumer Electronics Show and the major announcements expected from



The General becomes a Commodore.

Commodore (read about them here next month), but the 16K computer predicted in our *The Future of Commodore?* feature in the May *Ahoy!* seems to be a reality. Commodore as usual is playing mum, but *Ahoy!* has learned that a number of programmers have been commissioned to write software for the new machine, seen as an under-$100 replacement for the VIC 20. Word is that the computer will be released prior to the 264, probably toward the end of July, and that Commodore plans to move 750,000 of them during the last five months of 1984.

Further proof that Commodore is gearing up for future battles in the microcomputer marketplace: the company announced on May 22 that former Secretary of State Alexander M. Haig, Jr. has been appointed to the Board of Directors of Commodore International. General Haig is better qualified for the post than one might assume, having served prior to his appointment to President Reagan's cabinet as president and chief operating officer of United Technologies Corporation. So, even if Commodore's corporate resignations/firings continued to the very last executive, there'd still be someone left to take charge.

GET YOUR BACK UP

Creative Electronics' Battery Back-Up system will prevent programming loss due to blackout or power surge. The unit plugs in between your computer and the outlet and activates automatically when needed, providing 1-3 hours of reserve power. It charges continually from the computer's power supply and shuts off automatically on power down.

$69.95 for VIC version, $71.95 for C-64, plus $4.00 shipping (C.O.D. $2.50 extra). California residents add 6½% sales tax. 5% discount on orders received by December 10.

Creative Electronics, P.O. Box 4253, Thousand Oaks, CA 91360 (phone: 805-492-1506).

MONITOR FOR C-64/VIC

What a country we live in. As great as the Commodore 1702

color monitor is, alternatives continue to flood the market--this one from Japan, no less. The Sakata SC-100 is a 13" CRT composite color display monitor that is compatible with the C-64 and VIC 20.

Features include phone pin jack, 245 X 180mm display area, 280 line X 300 line resolution (90º inline), 0.65mm dot pitch, self-convergence, and display format of 100 characters. Suggested retail is $329.00.

Sakata U.S.A. Corporation, 651 Bonnie Lane, Elk Grove Village, IL 60007 (phone: 312-593-3211).

GRAPHICS PROGRAMS

Flying Colors features a windowed screen memory offering choice of thick and thin lines, automatic circles and boxes of varying sizes, erasures, and the ability to color in enclosed areas. Drawing speed is adjustable, as are brush sizes. A grid feature aids in picture alignment. Also included is a slide projector program that allows users to put together their own shows. For the C-64.

The Computer Colorworks, 3030 Bridgeway, Sausalito, CA 94965 (phone: 415-331-3022).

Inkwell Systems has enhanced its *Flexidraw* graphics soft-



The Sakata SC-100 color monitor. READER SERVICE NO. 75

ware/light pen combination (see the May *Scuttlebutt*) with the addition of *Pen Palette,* an interactive high resolution color program. It features two demonstration programs of color animation abilities and the means of saving color files to disk. The new version, titled *Flexidraw 3.0,* will retail for the same $149.95. For the C-64.

Inkwell Systems, 7770 Vickers Street, P.O. Box 85152 MB290, San Diego, CA 92138 (phone: 619-268-8792).

The *Super Sketch* graphics tablet/software cartridge combination lessens the need to work through the keyboard by putting some of the necessary commands on buttons of its own. Color graphics are created by pushing buttons and manipulating the stylus control.

Personal Peripherals, Inc., Merrick Park, 930 North Beltline, Suite 120, Irving, TX 75061 (phone: 214-790-1440).



Super Sketch ***uses pencillike stylus.***



An example of the graphics that can be produced with Personal Peripherals' **Super Sketch** ***hardware and software combo. READER SERVICE NO. 76***

WORD PROCESSORS

Timeworks' *Word Writer* features a full-screen (up to 80-character) format and a wide range of command features including automatic word wrapping, document chaining, form letter printing, page skipping, horizontal and vertical scrolling, disk cataloguing, resetting and centering, and 14 tabs. Two plastic keyboard overlays let you put all the commands at your fingertips. The program can be used with Timeworks' *Data Manager* and *Data Manager 2,* enabling you to print out name and address lists, individually address form letters, print labels, produce customized reports up to 20 columns wide, and calculate numerical data between columns. For the 64, *Word Writer* retails for $59.95, *Data Manager 2* for $49.95.

More information or a free catalog are available from Timeworks, Inc., P.O. Box 321, Deerfield, IL 60015 (phone:

312-291-9200).

Those looking ahead to the purchase of a 264 or V364 should be happy to know that Precision Software will manufacture *Easy Script* and *Easy Spell* on ROM chips for the new micros. These will be enhanced versions, featuring line wraparound, column move feature, row and column arithmetic capabilities, and a memory calculator.

Precision Software (USA) Inc., Suite 1100, 820 Second Avenue, New York, NY 10017 (phone: 212-490-1825).

Wordsmith 64, featuring full-screen text display, allows the user to keep two files in the computer at once. This facilitates the interfile transfer of information, useful when inserting info from mailing lists into form letters and merging numerical data or text



Word processing/data managing. READER SERVICE NO. 77

between files. Price is $39.95.

Softsmith Corporation, 2935 Whipple Road, Union City, CA 94587 (phone: 415-487-5900).

Quickwriter II features over 60 commands for the low price of $19.95, including form letter generation, search, hyphenization, and transfer, insertion, deletion, appending, and clipping and saving of words, sentences, or paragraphs.

Educomp, 2139 Newcastle Avenue, Cardiff, CA 92007 (phone: 619-942-3838).

Still not cheap enough? For $7.95 (cassette) or $10.95 (diskette) plus $2.00 handling you can have RAK's *C64 Type Right,* providing editing features and such commands as type, save, load, edit, display text, help, and quit. Printout routines will work with the VIC-1525 and most Centronics-type printers.

RAK Electronics, P.O. Box 1585, Orange Park, FL 32067-1575.

EDUCATION PROGRAMS

Scholastic has added two C-64 translations to its Wizware line. *Square Pairs* provides a series of match exercises (i.e., capital cities with countries) and allows children to make up their own games. *Turtle Tracks* lets kids learn programming fundamentals by using a turtle to draw scenes and designs. Retail is $19.95 each. Due by late summer are C-64 translations of *Bannercatch* and *Spelldiver,* both games by educational programming superstar Tom Snyder. Price will be $29.95 each.

Scholastic, Inc., 730 Broadway, New York, NY 10003 (phone: 212-505-3410).

Supplemental data disks are now available for $19.95 for *Word Attack!* and *Speed Reader II* from Davidson & Associates. The four disks for *Word Attack!,* a 675-word vocabulary program, contain 500 entries each and cover grades 4 and 5, 6 and 7, 8 and 9, and SAT preparation. The supplements for the *Speed Reader II* speed reading and comprehension program contain 35 stories each for elementary, junior high, senior high, and college students. For the C-64.

Davidson & Associates, 6069 Groveoak Place #12, Rancho Palos Verdes, CA 90274 (phone: 213-373-9473).

The Reading Growth series from Wrenwood Software can be used with a C-64 or VIC 20 (+3K) to improve the reading skills of learning disabled children. The twelve-level system uses a visual approach to teach a sight-word vocabulary as well as comprehension and spelling. For



Teaches and tests addition skills. READER SERVICE NO. 78

second through eighth grade students, with increasing levels of difficulty. Each level costs $12 for tape, $15 for disk.

Wrenwood Software, P.O. Box 152, Imlay City, MI 48444 (phone: 313-346-3491).

The "Diskovery" Reading Works series employs animated graphics, color and sound, and an arcade game format to encourage children to learn to read at their own pace. Latest releases are *Adding Machine* and *Take-Away Zoo,* both teaching early math skills. They join the previously released *Alphabet Factory* and *Match-Up* (for six to twelve year olds). On disk for the 64; $29.95 each.

Gladstone Electronics, 1585 Kenmore Avenue, Buffalo, NY 14217 (phone: 716-874-5510).

Davka Corporation has announced three C-64 programs on the subject of Passover. *How to Conduct a Seder* ($29.95) is a tutorial for both adults and kids.

All About Passover recounts the Exodus story and teaches holiday melodies. *Crumb Chaser* ($24.95) is an action game that requires the user to symbolically clean the leaven from his house before Passover arrives, sweeping crumbs up with a feather while avoiding furniture that's sliding around the polished floor.

Davka Corporation, 845 North Michigan Avenue, Suite 843, Chicago, IL 60611 (phone: 312-944-4070).

From Sierra On-Line comes *Story Maker,* allowing children to create a limitless number of original stories and illustrations, each with its own title, text, and characters; and *Wizard of ID's Touch Type,* which requires players to quickly type words thrown on a wall by a dragon before he destroys the Wizard. Sentence and paragraph typing is an option, as is generating your own lessons. Each $39.95, on disk for the C-64.

Sierra On-Line, Inc., Sierra On-Line Building, Coarsegold, CA 93614 (phone: 209-683-6858).

CRT IMAGING OUTFIT

The Kodak Instagraphic CRT Imaging Outfit will allow you to take instant color prints of static images on CRT screens. The package includes a camera with



Why is this man smiling? See below.
READER SERVICE NO. 81

close-up lens, cone, filter, print module, and brackets for mounting a 35mm SLR camera if desired.

The unit is aligned to a 9, 12, 13, or 19 inch screen as shown (an adaptor for each size is included). The cone shields the CRT screen from light and reflections while the module provides the correct lens-to-screen focal length and partially corrects distortion. An included Kodak Wratten filter can be inserted to color balance for the phosphors of a particular CRT.. Price is under $195.

Eastman Kodak Company, Motion Picture and Audiovisual Markets Division, 343 State Street, Rochester, NY 14650 (phone: 716-724-3169).



Kodak's CRT Imager may require one or two test exposures to arrive at the best exposure time. READER SERVICE NO. 82

NEW VIC & C-64 GAMES

Spy Vs. Spy, which has been running in *Mad Magazine* since long before any of us ever heard of a microchip, will be released as a C-64 game by First Star in September. As in the comic strip,



One of three toys-turned-games.
READER SERVICE NO. 83

the White Spy and the Black Spy will try to entrap each other in perilous situations. For one or two players.

First Star Software, 22 East 41st Street, New York, NY 10017 (phone: 212-532-4666).

By virtue of agreements with Mattel and Hasbro, Epyx has placed three of the most popular toys of all time on disk for the Commodore 64.

In *GI Joe,* the child selects a battlefield, outfits his soldier with clothing, equipment, and transportation, and goes into battle against non-humanoid opponents.

Hot Wheels lets the child construct a car onscreen, right down to the body striping. He may then maneuver his vehicle through a garage, city scene, and demolition derby.

Children may dress and redress *Barbie* with a variety of outfits created from scratch, as well as change her hair color and style.

The games, available this fall, will retail for about $29.95 each.

Epyx, Inc., 1043 Kiel Court, Synnyvale, CA 94089 (phone: 408-745-0700).

Four new C-64 entries from Datamost:

Ankh requires you to employ a mix of logic, destruction, and scientific method to guide your "Other" through all 64 rooms of the MetaReal world. $29.95.

On a lighter note, you must guide *Jet Boot Jack* through the Record Machine, flying over floors, riding elevators, collecting musical notes and avoiding "sleepers." $29.95.

Mychess II lets you play the computer or another person in 2D or 3D, color or black & white, on any of nine levels from beginner to master. Features include hints, instant replay, board rotation, and the ability to take back moves, examine an opponent's options, save to disk, and print out games. $34.95.

Polar Pierre requires one or two players (who can play at the same time) to guide Pierre and Jacques over an icy 100-screen obstacle course. Includes a tool kit to build screens. $29.95.

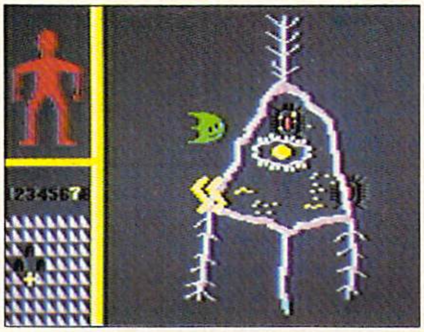
Datamost, 20660 Nordhoff Street, Chatsworth, CA 91311-6152 (phone: 818-709-1202).

In his *VIC Game Buyer's Guide* (March *Ahoy!*), Walter Salm mentioned the *Centipede*-like twitch game, *Video Vermin.* Advised Walter: "If you can come across a copy of this, grab it." Victory Software wrote to tell us that they'd acquired the rights to *Video Vermin,* and are offering it for $9.95 on tape. 3K or 8K memory expander required.



Ocean Quest: ***search the high seas.***
READER SERVICE NO. 84

Victory Software Corporation, 1410 Russell Road, Paoli, PA 19301 (phone: 800-243-1515).



Cell Defense: ***watch your bacteria.***
READER SERVICE NO. 85

Also undercutting the competition is Cosmi, offering a low-priced line of 64 and VIC games. *Forbidden Forest* (bow-and-arrow your way through woods full of giant spiders, bees, frogs—oh my) and *Caverns of Khafka* (search a vermin-infested tomb for treasure), both for the 64, come on cassette for $14.95 and disk for $19.95. *Aztec Challenge* (complete an obstacle course and be spared from ritual sacrifice) and *Slinky* (spring down a *Q*Bert*-like grid) are sold as Double-Paks, both cassette and diskette in one box, for $14.95 and $19.95 respectively. For $14.95 each, *Aztec Challenge, Spider Invasion,* and *Slinky* can be had in Tri-Compatible format (for the VIC 20, Atari, and TI99/4 or 4A computers).

Cosmi, 904 Silver Spur Road, Suite 402, Rolling Hills Estates, CA 90274 (phone: 213-795-9366).

SCIENCE SIMULATIONS

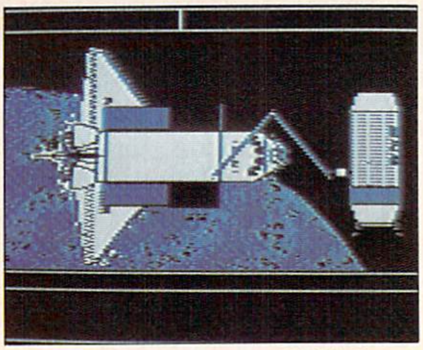
Turns out that HesWare had a plan in mind when they hired Leonard Nimoy as corporate spokesman. The actor with the well-known alias of science officer of the Enterprise seemed out of place promoting the *Minnesota Fats Pool Challenge,* but a perfectly logical choice to announce HesWare's new series of five science simulations and biofeedback system.

The announcement came aboard New York's floating Intrepid museum, which will feature the software in a permanent hands-on exhibit. The programs are as follows:

Project: Space Station, based on NASA design plans, allows the user to construct and operate an orbiting space station, overcoming such obstacles as budgeting problems, unfavorable press, and bad weather.

Life Force lets children manipulate protein synthesis in cells to produce complete animated organisms. The nine levels of difficulty, corresponding to creatures from simple amoebas to humans, require increasing amounts of skill and precision.

Ocean Quest takes players through the Atlantic, Pacific, and Caribbean in a sub, collecting marine data and searching for

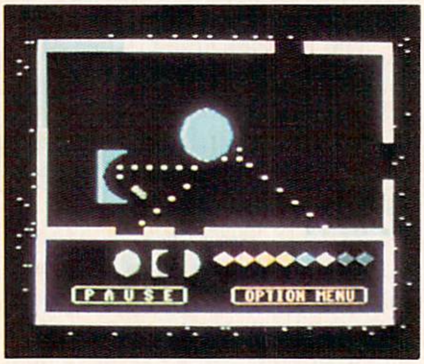


Space Station ***has a NASA base.***
READER SERVICE NO. 86

treasure. The player sees only fish indigenous to the sea where he makes his dive.

Cell Defense simulates the spread of a virus through the human body while the user controls the cellular defense system, utilizing interferon, macraphages, T-Cells, B-Cells, and antibodies, and accounting for the body's age and level of stress, alcohol, and drugs.

Reflections teaches the physical

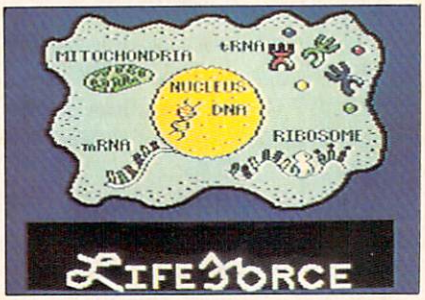


Reflections ***sheds light on physics.***
READER SERVICE NO. 87

principles of light refraction, absorption, and reflection by requiring children to manipulate variously sized and shaped mirrors to reflect light beams through portals.

The *Calmpute* biofeedback program combines software, a guidebook, and a handheld GSR (Galvanic Skin Response) monitor to measure stress levels and suggest tension-reducing exercises. Placing two fingers on the GSR sends electronic signals to the program, which processes the signals and displays the results in various forms (including oscilloscopelike charts, bar graphs, geometric shapes, and audible tones). The included *Calm Prix* game, wherein the car moves faster when the user relaxes and slows down when his stress level rises, teaches stress control.

HesWare, 150 North Hill Drive,



Life Force: ***create a monster.***
READER SERVICE NO. 88

Brisbane, CA 94005 (phone: 415-468-4111).

TOO HOT NOT TO PRINT

Okidata's OKIMATE 10 will offer what the company assures us is letter-quality type at a price of under $300.

The dot-matrix printer produces type by means of thermal transfer—a process different from regular thermal printing, which requires the use of heat sensitive paper that is difficult to handle, discolors with age, and ain't cheap. The printhead of the OKIMATE contains a tiny heating element which, as it moves, melts ink off the ribbon onto the paper—any kind of paper, including Rolodex or mailing labels.

For free information about products pictured in Scuttlebutt *and elsewhere in* Ahoy!, *circle the corresponding number on the Reader Service Card between pages 90 and 91.*

Because the dot matrix printout is not formed by individual pins striking out an image, but by melting and overlapping ink, it is impossible to discern individual dots.

The OKIMATE will offer graphics capabilities in addition to text-handling. The ribbons, which are similar to the film ribbons used in IBM typewriters, can produce a variety of colors.

Okidata will make the unit available through mass merchandisers as well as dealer outlets.

Okidata Corporation, Mt. Laurel, NJ (phone: 215-627-3535).

HOW APROPOS

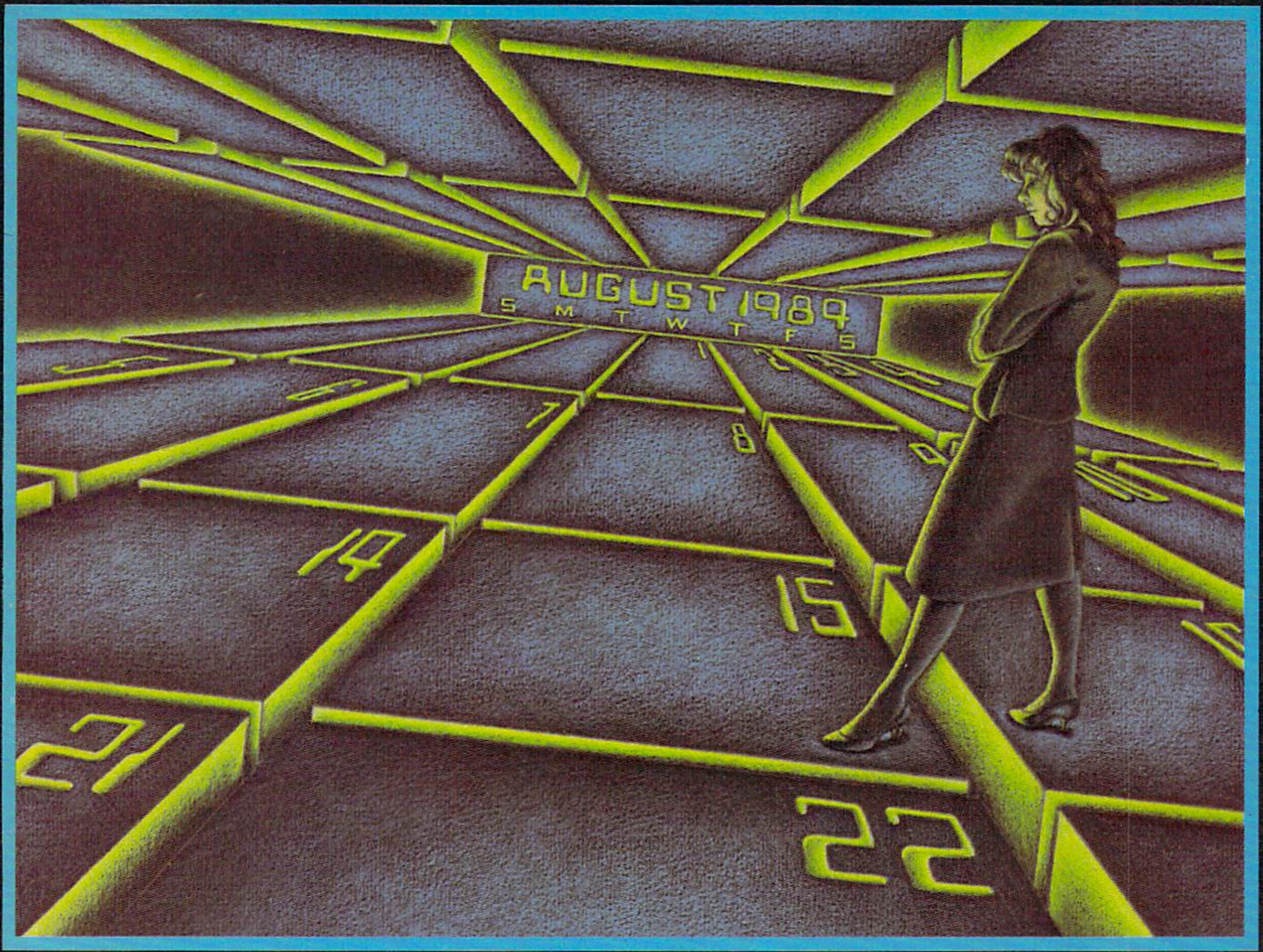
Aprospand-64, a 4-connector expander for the C-64, lets you plug in up to four cartridges and access one or any combination. It features a system reset button, a fuse to protect your computer, and a one-year warranty. $39.95 plus $3.00 shipping and handling.

Apropos Technology, 1071-A Avenida Acaso, Camarillo, CA 93010 (phone: 805-482-3604).

NEXT MONTH

As mentioned earlier in this edition of *Scuttlebutt,* we're going to press just before the June Consumer Electronics Show. With Commodore the unchallenged leader in the microcomputer marketplace, the list of hardware and software releases for the 64 and VIC announced at the show should be staggering. If you sometimes skip our news section, don't do it next month—we'll be detailing the direction that Commodore and third-party manufacturers will be taking for months to come. As yet, we know nothing for certain about the news we'll be providing—except that we'll break it before any other Commodore magazine, and that we'll do it in greater detail.

MICRO-MINDER



© Kat Reviaska 1984

by Bob Lloret and Joseph Fusco

With the age of computers well under way, just about every home has one and those that don't soon will. In time, a program will be available for just about anything you want to do, whether it's home finance, grocery planning, or any type of data storage. Enter *Micro-Minder.*

You can use this program to keep track of important dates, birthdays, or any appointments you don't want to forget. The program makes use of sequential files on the C-64. Although there are more sophisticated data-handling methods available, we felt sequential filing was adequate for this application. In the future we plan a variety of data handling programs to show the more advanced ways to manipulate all types of Data. Type in the program, then save a copy to a fresh formatted disk.

After saving your copy, type "RUN" and the title screen will appear. You'll notice the unique manipulation of string variables showing the designers' names scrolling across the screen. The next screen asks the operator to choose a New Calendar or Old Calendar. Be very careful here. If you choose New Calendar, the program will create the necessary files needed to store your information, wiping out any previous information stored there.

Obviously, if you already have info stored, always choose #2 Old Calendar unless you wish to start a New Calendar file. After making your choice, the next screen shows your main menu titled "selections." From here you can manipulate all your information. If you're starting a New Calendar you would press #1 to add some appointments to your file. One im-

Continued on page 98



© Laura Ewig 1984

Creating Your Own Games on the VIC and 64

By Orson Scott Card

Why are there so few computer word games, and why are most of those so bad?

After all, word games are as natural to us as speaking. My three-year-old daughter is learning to spell. She has a reading and writing vocabulary of about two dozen words. But please don't tell Emily that she's been studying the English language. *She* thinks that she's playing games.

Language games delight children almost from the moment they catch onto the fact that those jabbering sounds adults keep making are supposed to mean something.

Language games begin with babbling—repeating sounds over and over. Then children play with rhymes and puns and nonsense words. When they catch onto the written language, the alphabet is also a game. What words start with the sound of *P*?

It isn't until the kids get to school and start getting graded and compared to other children that they discover that language and words and spelling are miserable work, not fun at all.

However, despite the best efforts of the worst teachers (or because of the best efforts of the best teachers), some lucky children never forget to be playful with words. I'm one who still goes crazy over a game of *Scrabble* or *Boggle* or *Perquackey.* And the very fact that those games are commercially successful is pretty firm evidence that I'm not the only one.

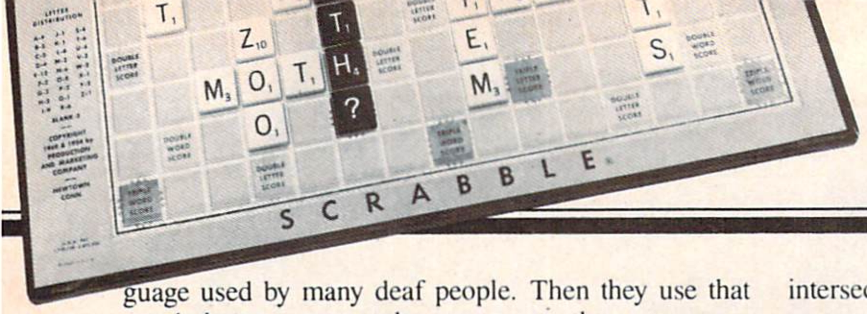
Word games are big business because a lot of people still love the challenge of putting letters together in patterns that mean something.

So why aren't there more *computer* word games?

COMPUTERS AREN'T EVEN AS SMART AS CHIMPS

The problem is that computers are so dumb. Language is beyond them.

Experimenters have taught chimpanzees to do something pretty close to language. The chimps learn a limited vocabulary of signs, like the sign lan-



guage used by many deaf people. Then they use that vocabulary to put together sentences; there are even hints that once the chimps get the concept, they can coin new "words."

Computers can't do it. Computers are still as dumb as parrots: they can only spout the words that have been put into them. They don't learn new words from experience; they don't pick up nuances; to them, a word is a string of 8-bit bytes.

WHAT ABOUT PROGRAMMING LANGUAGES?

Programming languages aren't languages. They only *look* like languages to the people using them.

For instance, take the BASIC command PRINT. To an English-speaking human being, the word suggests putting down letters—it means something, and so it's easy to remember.

To the computer, though, PRINT is a five-byte string. When BASIC runs across it in a program, it compares it to a table of commands. The table contains all the valid commands and functions, like GOTO and LIST and ABS and CHR$. Let's say that the computer discovers that PRINT matches the twentieth command in the table. BASIC then goes to the twentieth address in a dispatch table and jumps to the machine language routine at that address. It happens that that particular machine language routine is the one that puts the string following the PRINT command into screen memory, starting at the cursor position.

But the word PRINT means nothing to the computer. What matters is that it is the twentieth command in the table. If BASIC were not on a ROM chip, you could change PRINT to any word you wanted—WRITE, for instance, or FLASH. As long as the word you type matches the twentieth word in the command table, it will work just fine.

Computer languages are not languages. They are mathematical and logical systems masquerading as languages so people can learn to use them more easily.

LETTER GAMES AND THE VOCABULARY PROBLEM

Fortunately, most word games aren't language, either, strictly speaking. Most word games are really *letter* games.

Take *Scrabble*, for instance. The object of the game is to take seven letters, chosen at random, and place some or all of them on the board to form a single word. That word, however, must intersect with words or letters already on the board, and it must intersect in such a way that all combinations of two or more letters are valid words.

What does the *meaning* of a word have to do with the game? Nothing at all. The only place where language and *Scrabble* meet is that to be valid, a letter combination must form a legitimate English word. If one player is in doubt about the word you just put down—for instance, BORT—he can go look it up in the dictionary and discover that BORT is a legitimate English word.

This sounds suspiciously like what BASIC does when it finds a string of letters—it goes and looks it up in the command table. If it matches, it's valid; if not, it isn't.

Well, why can't a computer be a good *Scrabble* player?

It can. It can be a superb *Scrabble* player. All you need is a vocabulary list of all the words in the English language.

Let's ignore the fact that such a vocabulary would have more entries than an unabridged dictionary, since the dictionary doesn't have separate entries for plural forms of nouns or tenses and persons of verbs. Forget the number of disks such a vocabulary would use up. Forget the problems involved in writing a program that wouldn't take an endless amount of time to come up with a move.

Conceivably, given enough time and enough vocabulary, a computer could play *Scrabble* perfectly. It could come up with the best possible placement of the letters it has *every single turn.*

You couldn't beat it. It would know more words than you; it would think of every possible combination.

It would also be no fun at all to play with.

What's fun with *Scrabble* is pitting your vocabulary and your ability to think of words under pressure against other players' abilities. Other *human* players. The fun comes from your resourcefulness, the sudden flash of insight as you think of a word that you hadn't seen in your letters until now.

It is the working of the human brain that makes letter games worth playing. That goes for *Boggle* and *Perquackey* and all the other letter games.

So even an imperfect computer opponent, whose program deliberately lets it be stupid enough to lose now and then, isn't much fun.

FINDING THE RIGHT JOB FOR YOUR COMPUTER

This doesn't mean that computers are useless when it comes to letter games. It only means they are useless as letter game *opponents.* It's like playing

your first tennis game with John McEnroe. Even if he went easy on you and let you win, you'd know that there was no real contest.

When you set the computer to do the same task as a human being, in competition with the human being, there's never a contest. If you win, so what? You beat a machine. If you lose, how devastating! A machine beat you!

You get no thrill from victory, but you still have the agony of defeat.

How do videogames solve this? They have the computer doing a *different* task. For instance, in *Donkey Kong* the human player is trying to move Mario up some ladders and along some platforms to reach his captive girlfriend.

The computer, however, is doing two different jobs, and neither of them is in direct competition with the human player.

The computer's first job is housekeeping. It keeps the game world "alive" by moving Mario according to the player's instructions, making sure Mario doesn't make illegal moves, and maintaining all the sights and sounds on the screen.

The computer's second job is creating obstacles. It moves the gorilla and rolls the barrels and moves the flames and rolls the conveyer belts and bounces the girders and counts down the bonus, any one of which could spell Mario's doom.

If the computer had another Mario, and it tried to race the human player through the obstacles to get to the girl, the game would be as ridiculous as a beginner playing tennis with McEnroe. The computer has perfect reflexes. Its timing is superb. It could never fail. It would win every time. Or if it didn't win, it would be because the programmer went easy on you, like McEnroe deliberately letting a few balls go by him or lobbing most of the balls near enough for you to hit them.

This is a general principle for almost all computer game design: *The computer provides the environment while human beings play.*

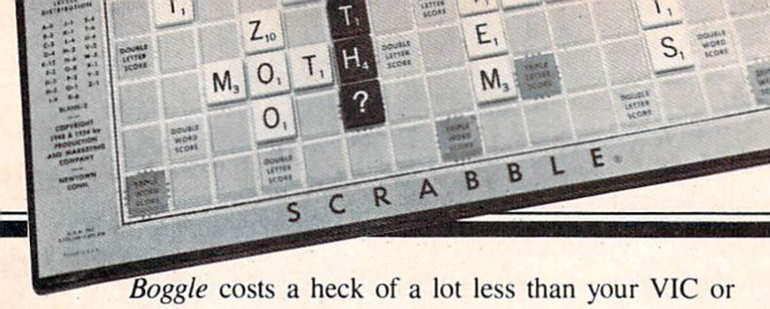
There are seeming exceptions, of course, like sports simulations in which the computer controls the opposing team. In such games, however, there are strong elements of strategy on both sides, requiring offense and defense to outguess each other. Once the computer is committed to a wrong course, you can genuinely beat it. And notice that the computer and the player never do the same job *at the same time.* While you're playing offense, the computer is playing defense. In a sense, you and the computer provide the game environment for each other. Only in a footrace are you trying to perform the same task

You could argue the same thing about *Scrabble,* and the makers of *Monty Plays Scrabble* probably would. That is, when it's the computer's turn to play, it has to make the best possible word given its random tiles *and* the arrangement of letters already on the board. In a sense, you have participated in creating the environment for the computer's turn. However, the board only changes a word at a time from turn to turn—it is by no means as big a change as the differences between blitzing and defensing a short outlet pass in football. I admit the exception, but I still insist it doesn't matter. The principle stands: Computer games are fun when the computer provides the environment while the human being plays.

PROGRAMMING THE ROLL OF DICE

One common device in letter games is letter dice, six-sided cubes with a letter on each side. Roll them, and then try to make words out of the letters that turn up.

This is a job computers can easily do—rolling the dice for you. But come to think of it, you can roll the dice for yourself, and a game of *Perquackey* or



Boggle costs a heck of a lot less than your VIC or 64.

Ah, but the computer is more versatile than little plastic dice. The dice have six sides—but you can program seven-sided dice. Or two-sided dice. Or 7499-sided dice.

Also, the game makers have very carefully chosen which letters to put on each die. There are always a couple of dice that have nothing but vowels on them. No matter which way they roll, you'll always have at least a couple of vowels. Other dice are nothing but consonants, and other dice have a few vowels and a few consonants. However, whatever is printed on the dice is the same every time you play.

With the computer, you can change the mix. You can have a set of letter dice that guarantee that you'll always have an *E* and an *A,* just by having one die with all *E*'s on it, and another with all *A*'s. That would make the game a lot easier.

Better still, you could design a game in which the players played with different sets of dice. Young players could have a set of easy dice, with guaranteed vowels and no *X*'s or *Q*'s or *Z*'s. More experienced players could have harder dice, and experts could have really challenging dice—and the computer could do all the housekeeping.

How does it work? Let's roll up our sleeves and get down in the mud of actual programming.

MID$ AND RND

Here is a six-sided die, with only vowels on it:

```
10 DC$="AEEIOU"
```

It may look like a six-letter string, but the computer can easily "roll" it by randomly choosing one of the letters.

First, we choose a random number between 1 and 6:

```
20 R=1+INT(6*RND(9))
```

How does the RND function work? When you call the function, it returns a random number between 0 and 0.9999. . .To convert it to a whole number between 0 and 20, you just multiply it by *one more* than the highest number you want to allow: R=INT(21*RND(9)). The 21*RND(9) produces a number from 0 to 20. The INT function chops off any fraction, so it will be a whole number.

But for our six-sided die, we don't want the lowest possible number to be 0, we want it to be 1. So we call for a random number between 0 and 5 by using INT(6*RND(9)), and then add 1 to it. So instead of a random number between 0 and 5, we have a random number between 1 and 6. To have a random number between 20 and 29, we'd use R=20+INT(10*RND(9)).

Now that we have a random number, we need to take that letter out of the string:

```
30 L$=MID$(DC$,R,1)
```

How does the MID$ function work? It takes the string DC$, finds the *R*th position in the string, and then takes 1 letter starting at that position. You could take two letters from position 4 by using MID$(DC$,4,2). But for our letter die, we only want one letter at a time.

The MID$ function is the reason the random number had to be between 1 and 6. If it had been a number from 0 to 5, the program would stop with an error whenever we had a 0 value, because the first position in a string is 1—there is no 0 position. MID$ would go crazy trying to find MID$(DC$,0,1).

Now let's put these lines together into a sample program:

```
10 DC$="AEEIOU"
20 R=1+INT(6*RND(9))
30 F$=MID$(DC$,R,1):PRINT F$" ";
40 IF PEEK(197)=64 THEN 40
50 GOTO 20
```

This program rolls the die, prints the face that turned up in the roll—F$—and waits until you press a key before going back and rolling it again.

Notice that since there are two *E*'s on the die, *E* is twice as likely to turn up as any other letter.

To roll ten dice, you just do that ten times with ten different dice.

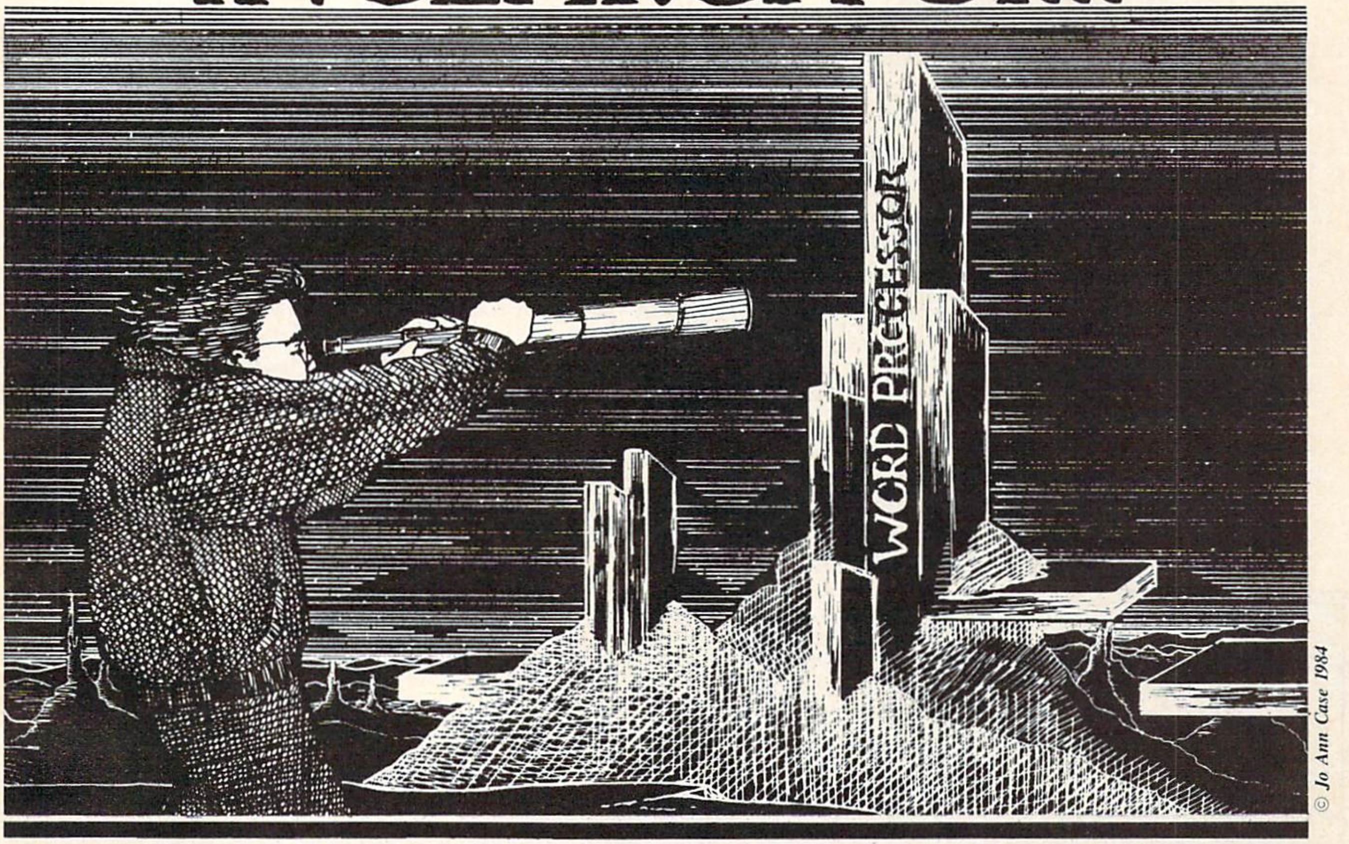
A LETTER-DICE GAME

At the end of this column you'll find a program, *Words Worth,* that lets you set up three sets of sixteen dice, one easy, one moderate, and one hard. It allows up to six players, and each can choose his own difficulty level. Besides the different sets of dice, the difficulty levels also change the time limits each player has, with shorter time at the harder levels.

At the beginning of each player's turn, the sixteen dice are rolled and displayed in 16 boxes on the screen. Then a timer counts down the player's time. At any time during a turn, the player can press a

Continued on page 94

IN SEARCH OF...



A WORD PROCESSOR

FOR YOUR COMMODORE 64

By Sanjiva K. Nath

Selecting the word processing software for your Commodore 64 that best fits your needs requires: 1) understanding the basic concepts of word processing, 2) knowing the features offered by existing commerical programs, and 3) assessing your long-term word processing needs.

In the first part of this article, we will briefly introduce you to word processing and its applications. A discussion of the features commonly associated with commercial word processors available for the C-64 will also be provided, following which criteria for evaluating these programs will evolve. Using these criteria, you will be able to evaluate a given word processor and select the one most appropriate for your applications.

In the second part of this article (coming next month), we will briefly describe ten word processors currently available for your C-64.

WHAT IS WORD PROCESSING?

Word processing generally refers to a computerized, typewriter-based system that allows you to enter text from the keyboard, store it in the computer's memory, edit it, format it, and print it on the typewriter or printer. A conventional word processor, in fact, functions as a super typewriter. It generally consists of a typewriter keyboard, a video display unit (monitor), a letter-quality (daisy wheel) printer, and built-in word processing software.

The use of typewriters (especially for two-finger typists like me) does not necessarily speed up the process of writing, but only makes the text appear more readable compared to handwriting. (The type-

Portions of this article are excerpted from The Commodore 64 Software Buyer's Guide *by Sanjiva K. Nath and Terry Silveria (published June 1984 by Robert J. Brady Co.).*

WORD PROCESSOR SURVEY

By Richard Herring

Lots of programs will help balance your checkbook, keep phone numbers, and do linear equations: that stuff we all love to spend our time on. One kind of software, however, is useful in just about every home and business setting—the word processor.

Word processing programs let you type on the computer screen and do all your correcting and editing before you print a final copy. Even that printed copy is easy to change—edit on the screen, then reprint. Recognizing the value of word processing, dozens of companies have produced software with a seemingly endless variety of features.

We sent questionnaires on 47 different word processing programs to the companies that market them. The responses we received are shown in tables which group similar features.

writing process generally involves typing a letter or report, which may be proofread and retyped until a final satisfactory version is obtained.)

A word processor, on the other hand, makes the process of creating, editing, and printing of text more efficient. Using a word processing program on your Commodore 64, you type text on the keyboard and the computer simultaneously displays it on the screen of your TV or monitor. You can then scroll the text up or down and view the selected pages. You may then edit the text using simple commands and function keys.

Using a word processor, you may edit pages of documents as many times as you want without once having to retype a page. You can format your text in any way you would like to see it printed (i.e., left justified, right justified, or centered); all you

C-64 WORD PROCESSING PROGRAMS

	Available on disk? Price?	Available on tape? Price?	Available on cartridge? Price?	Comes with backup copy?	Are separate backups available? Cost?	Company provides phone support?	Toll free phone support?	Warranty period?	Cost of replacement after warranty?	Cost to upgrade to new version?
3 + 1	no	no	yes	no	no	yes		90		
The Bank Street Writer	69.95	no	no	yes	yes	yes	no	*1	*1	
Better Letter & Writer	34.95	no	no		yes	yes		90		10.00
Bliztext 1.1	89.00	89.00	no	no	10.00	yes	no	90	10.00	10.00
Circascript	39.95	no	no	no	no	yes	no	30	n/a	none
Copy-Writer	79.95	no	no	yes	yes	Yes	No	life		ship
C64 Type-Write	10.95	7.95	no	no	3.00	yes	no	90	3.00	3.00
Cut and Paste	50.00	no	no	no	no	yes	no	90	7.50	7.50
Heswriter	no	no	39.95	no	no	yes	yes	180	6.00	6.00
Homeword	69.95	no	no	no	10.00	yes	no	90	5.00	10-25
Insta Writer	no	no	51.95	no		yes	no			
Janewrite	yes	no	yes			yes	no	90	5.00	
Magic Desk	no	no	69.95	no	no	yes	no	90	½ Pr.	
Omniwriter	69.95	no	no	no	10.00	yes	yes	180		
Paper Clip	99.95	99.95	no	no		yes	no			5.00
Script 64-PCS	99.95	no	no	no	5.00	yes	no	180	5.00	5.00
Script 64-Richvale	99.00	65.00	no	no	13.00	yes	no	180	13.00	13.00
SM-Text 64	60.00	no	no	no	5-10	yes	no	90		
Smithwriter	59.95	no	no	no	10.00	yes	yes	*3	10.00	10.00
SuperText	99.00	no	no	yes	10.00	yes	no	yes	10.50	
Textmaster	39.95	*2	no	no	10.00			yes		
Totl Text 2.6	44.00	40.00	no	no	5.00	yes	no	30	5.00	10-up
Word Commander 64	49.95	49.95	no	no	12.95	yes	no	90	5.00	*4
Wordcraft 40		no	124.95	no	99.95	yes	no	90	39.95	retail
WordManager	*5	*5	no	no	5.00	yes	no	365	5.00	5.00
Wordpro 3 Plus/64	99.95	no	no	no	15.00	yes	no	30	12.00	15.00
Word Processor (Prof)	99.95	no	no	no	7.00	yes	yes	90	10.00	10.00
The Word Processor-PCS	99.95	no	no	no	5.00	yes	no	180	5.00	5.00
WordProcessor 64	49.95	no	no	no	20.00	yes	no	90	20.00	*6
Wordsmith 64	69.95	69.95	no	no	10.00	yes	yes	*3	10.00	10.00
Word Writer	49.95	no	no	yes	free	yes	yes	90	free	free
Write Now!	no	no	no	no	no	yes	no	life	n/a	no chg
The Writer's Assistant	29.95	no	49.95	no	10.00	yes	no	90	10.00	5.00

DOCUMENTATION

	How many pages in manual?	Table of contents?	Tutorial section?	Reference section?	Index?	Quick reference card?	Help screens? How many?	Includes demo on disk or tape?	Program uses menus?	How many levels of menus?
3 + 1		yes	yes	yes	yes	yes	no	no	no	n/a
The Bank Street Writer	35	yes	*1	no	yes	no	3	*1	yes	3
Better Letter & Writer		yes					16		yes	3
Bliztext 1.1	60	yes	yes	yes	yes	yes	0	no	no	N/A
Circascript	40	yes	yes	no	yes	no	4	no	yes	2
Copy-Writer	82	yes	yes	yes	yes	yes	0	no	no	N/A
C64 Type-Write	1	no	no	yes	no	no	1	no	yes	1
Cut and Paste						yes			yes	
Heswriter	20	no	no	yes	no	no	0	no	no	n/a
Homeword	56	no	yes	*2	yes	yes	yes	yes	yes	10
Insta Writer	28	yes	yes	no	yes	no	*6	no	yes	1
Janewrite	240	yes	yes	yes	yes	no	50	yes	no	n/a
Magic Desk	6	no	no	yes	no	no	yes	no	yes	
Omniwriter	78	yes	no	no	no	yes	0	yes	yes	1
Paper Clip	180	yes	yes	yes	yes	no	no	yes	no	n/a
Script 64-PCS	150	yes	no	yes	yes	no	3	no	yes	2
Script 64-Richvale	140	yes	*3	*3	yes	*3	3	no	no	n/a
SM-Text 64	30	yes	no	no	yes	no	yes	no		
Smithwriter	49	yes	yes	yes	yes	yes		no	yes	
SuperText	130	yes	no		no	yes	4	no	no	n/a
Textmaster	28	yes	yes	no	no	yes	no	yes	no	n/a
Totl Text 2.6	36	yes	yes	yes	no	yes	1	yes	yes	2
Word Commander 64		yes	yes	yes	yes	yes	no	no	yes	1
Wordcraft 40	51	yes	yes	*4	yes	no	0	no	*5	n/a
WordManager	25	yes	no	no	yes	yes	1	no	no	n/a
Wordpro 3 Plus/64	172	yes	yes	yes	yes	no	1	yes	no	n/a
Word Processor (Prof)	230	yes	yes	yes	yes	yes	0	no	yes	1
The Word Processor-PCS	75	yes	no	yes	yes	no	0	no	no	n/a
WordProcessor 64	208	yes	yes	yes	yes	yes	1	yes	no	n/a
Wordsmith 64	24	yes	no	yes	no	yes	no	no	no	n/a
Word Writer		yes	yes	no	no	*7	*7		*7	n/a
Write Now!	106	yes	yes	yes	yes	yes	4	no	yes	2
The Writer's Assistant	35	yes	yes	yes	yes	yes	yes	yes	yes	3

*FOOTNOTES ON PAGE 28

have to do is specify the desired parameters. Depending upon the particular program, you can also automatically number the pages of your document and create headers, footers, and line spaces according to your specifications. You can print your documents any number of times desired with the ease of typing simple commands. You can store your documents on floppy diskettes and retrieve them whenever you wish. This eliminates accumulation of loose pages of text during the editing process.

APPLICATIONS OF WORD PROCESSORS

Before computers became affordable for the general public, word processing was used in few large businesses. The "dedicated" office word processing system was specifically designed for professional operators and cost many thousands of dollars. Few individuals could justify spending such large sums of money for word processing.

Now, a word processing system can be set up on a personal computer such as your 64 for less than one thousand dollars—and word processing software is available for almost all microcomputers. This has generated many cost-effective applications of word processing. For example, a small business can use a low-cost word processing system to generate reports for investors or personalized letters for clients. Students can use word processors to write class assignments and term reports. Text created on a word processor can also be transmitted to other computers over the phone line by using a modem.

Generally, any application that requires you to write and type may be performed more efficiently using a

	CURSOR MOVEMENT FEATURES With one command, can you move the cursor:									BLOCK FEATURES Can you:					
	—up, down, left, or right one space?	—up or down a page or screen?	—left or right on word?	—to the beginning or end of a line?	—to the top or bottom of the screen?	—to the beginning or end of the document?	—to the beginning of a page?	—to the beginning of a sentence?	—to the beginning of a paragraph?	—mark blocks of text?	Maximum number of characters in block?	—copy blocks?	—move or delete blocks?	—save blocks on disk?	—read disk files into the middle of text you are entering?
3+1	yes	yes	no	yes	yes	yes	no	no	no	yes	880	yes	yes	yes	*4
The Bank Street Writer	yes	no	no	no	no	yes	no	no	no	yes	15	no	yes	no	no
Better Letter & Writer	yes		no	yes	yes	yes	yes	yes	yes	yes		yes	yes	no	yes
Bliztext 1.1	yes	no	yes	yes	no	yes	no	no	yes	yes	4K	yes	yes	no	yes
Circascript	yes	yes	no	no	no	yes	no	no	no	yes	*1	no	no	yes	yes
Copy-Writer	yes	no	no	no	no	yes	no	no	no	yes		yes	yes	no	yes
C64 Type-Write	yes	no	no	no	no	no	no	no	no	no	n/a	n/a	n/a	n/a	n/a
Cut and Paste	yes	yes	no	no	yes	yes	yes	no	no	yes	*1	yes	yes	yes	yes
Heswriter	yes	yes	yes	yes	yes	yes	no	yes	yes	yes	734	yes	yes	yes	yes
Homeword	yes	yes	yes	no	yes	yes	yes	no	no	yes	*1	yes	yes	no	yes
Insta Writer	yes	yes	no	yes	no	no	yes	no	no	yes	2½K	yes	yes	no	no
Janewrite	yes	yes	yes	yes	yes	yes	no	yes	yes	yes		yes	yes	no	no
Magic Desk	yes		no	no	no		no	no	no				no		
Omniwriter	yes	yes	no	yes	yes	yes	yes	no	no	yes	*2	yes	yes	no	yes
Paper Clip	yes	no	no	no	yes	yes	no	no	no	yes	*2	yes	yes	yes	yes
Script 64-PCS	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	30	yes	yes	yes	yes
Script 64-Richvale	yes	yes	yes	no	yes	no	yes	no	no	yes	880	yes	yes	yes	*3
SM-Text 64	yes	yes	yes	yes	yes	yes	yes	no	no	yes	*2	yes	yes	no	no
Smithwriter	yes	yes	yes	no	no	yes	no	yes	no	no					
SuperText	yes	yes	no	yes	yes	yes	yes	no	no	yes		yes	yes	yes	yes
Textmaster	yes	yes	no	no	yes	yes	no	no	no	yes	240	yes	yes	no	yes
Totl Text 2.6	yes	yes	no	no	yes	yes	no	no	no	yes		no	yes	no	*4
Word Commander 64	yes	yes	no	no	yes	yes	yes	no	no	yes	*2	yes	yes	no	no
Wordcraft 40	yes	yes	no	no	yes	yes	yes	no	no	yes	25K	yes	yes	no	yes
WordManager	yes	yes	no	yes	yes	yes	no	no	no	yes	3½K	yes	yes	no	no
Wordpro 3 Plus/64	yes	no	no	yes	no	no	no	no	no	yes	13K	yes	yes	yes	yes
Word Processor (Prof)	yes	yes	yes	yes	yes	yes	no	yes	yes	yes	*1	yes	yes	yes	yes
The Word Processor-PCS	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes		yes	yes	yes	yes
WordProcessor 64	yes	yes	no	yes	yes	yes	no	no	no	yes	30K	yes	yes	yes	yes
Wordsmith 64	yes	yes	no	no	yes	yes	no	no	no	no	240	yes	no	no	yes
Word Writer	yes	yes	no	yes	yes	yes	yes	no	no	yes	*2	yes	*7	yes	no
Write Now!	yes	yes	no	no	yes	yes	yes	no	no	yes	*2	yes	yes	yes	yes
The Writer's Assistant	yes	yes	yes	yes	yes	yes	yes	no	no	yes	*6	yes	yes	yes	yes

*FOOTNOTES ON PAGE 28

word processor. A word processor can handle most business correspondence in a fraction of the time it would take if conventional typewriters were used.

As Commodore 64 owners, you are especially fortunate if you want to add word processing capabilities to your computer. Because of the low cost of the computer and its immense popularity among software developers and computer users, the C-64 can be set up as a powerful word processing system at minimal cost. Many word processing programs and add-on peripherals are available for your computer, and in order to choose the right system to match your business or personal needs, you first will need to know what features and criteria to look for in a particular word processor.

WORD PROCESSOR FEATURES

To assist you in your comparative evaluation of commercial word processors for the C-64, we have grouped the features commonly available in most programs into the following categories:

START-UP OPTIONS

These are the options presented to you by the program, often via the master menu, when you first load and execute the program. (The master menu provides an easy way to select the options.) Through these options, you may configure the system peripherals from within the program. These options generally include printer setup, DOS commands, screen text/background color adjustment, etc.

Printer setup refers to initializing the particular printer that you may be using with the Commodore

ONSCREEN FORMATTING CAPABILITIES

	Does the program automatically reformat text as it is entered?	Can you set tabs?	Can you add columnar data?	Can you sort columns?	Can you automatically center headings?	Can you embed page breaks?	Do page breaks show on the screen?	Can you force lines to stay together through page breaks?	Is there automatic word wrap?	Can you change screen colors?
3 + 1	no	yes	*4	*5	yes	yes	yes	yes	*6	yes
The Bank Street Writer	yes	no	no	no	yes	no	no	yes	yes	no
Better Letter & Writer	yes						yes		yes	yes
Bliztext 1.1	no	yes	no	no	no	yes	yes	no	no	yes
Circascript	yes	yes	no	no	yes	yes	no	no	no	no
Copy-Writer	no	yes	no	no	yes	yes	yes	yes	no	
C64 Type-Write	yes	no	no	no	no	no	no	no	yes	no
Cut and Paste	yes	no	no	no	no	yes	*1	yes	yes	no
Heswriter	no	no	no	no	no	yes	no	no	no	no
Homeword	yes	yes	no	no	yes	yes	yes	no	yes	no
Insta Writer	yes	yes	no	no	yes	no	yes	no	yes	yes
Janewrite	no	no	yes	no	yes	no	no	no	yes	no
Magic Desk		yes								
Omniwriter	yes	yes	no	no	yes	yes	yes	no	yes	yes
Paper Clip	no	yes	yes	yes	yes	yes	yes	yes	no	yes
Script 64-PCS	no	yes	yes	yes	yes	yes	yes	no	yes	yes
Script 64-Richvale	no	yes	yes	no	yes	yes	yes	yes	no	yes
SM-Text 64	yes	yes	no	no	yes	yes	yes	yes	yes	yes
Smithwriter	yes	yes	yes	yes	no	yes			yes	yes
SuperText	yes	yes	no	no	yes	yes	no	no	yes	yes
Textmaster	no	no	no	no	no	yes	yes	no	yes	yes
Totl Text 2.6	yes	yes	no	no	yes	yes	yes	no	no	yes
Word Commander 64	yes	no	no	no	yes	yes	yes	no	yes	yes
Wordcraft 40	yes	yes	no	no	yes	yes	yes	no	yes	yes
WordManager	yes	yes	no	no	yes	no	no	no	yes	no
Wordpro 3 Plus/64	no	yes	yes	no	yes	yes	no	yes	yes	yes
Word Processor (Prof)	yes	yes	no	no	yes	no	*3	no	yes	yes
The Word Processor-PCS	no	yes	yes	yes	yes	yes	yes	yes	yes	no
WordProcessor 64	yes	yes	no	no	yes	yes	yes	yes	yes	yes
Wordsmith 64	no	no	no	no	yes	no	no	no	yes	yes
Word Writer	yes	yes	yes	no	yes	no	yes	no	yes	yes
Write Now!	yes	yes	no	no	yes	yes	yes	yes	no	yes
The Writer's Assistant	yes	yes	yes	no	yes	yes	yes	no	no	yes

DELETE FEATURES
With one command, can you delete:

	—single characters?	—single words?	—whole lines?	—sentences?	—screens?	—all text before the cursor?	—all text after the cursor?	Can you restore deleted text?
3 + 1	yes	no	yes	no	yes	no	yes	yes
The Bank Street Writer	yes	yes	yes	yes	no	no	no	yes
Better Letter & Writer	yes	no	yes	no	yes	yes	yes	no
Bliztext 1.1	yes	yes	yes	yes	yes	no	no	no
Circascript	yes	yes	no	no	*1	no	no	yes
Copy-Writer	yes	yes	yes	no	yes			
C64 Type-Write	yes	no	no	no	no	no	no	no
Cut and Paste	yes	*2	*2	*2	*2	*2	*2	yes
Heswriter	yes	yes	yes	yes	no	yes	yes	no
Homeword	yes	yes	yes	no	yes	no	no	yes
Insta Writer	yes	no	yes	no	yes	no	no	no
Janewrite	yes	yes	yes	yes	yes		yes	yes
Magic Desk	yes	no	no	no	no	no	no	
Omniwriter	yes	yes	yes	yes	yes	no	yes	no
Paper Clip	yes	*3	yes	*3	yes	no	yes	no
Script 64-PCS	yes	yes	yes	yes	yes	no	yes	yes
Script 64-Richvale	yes	yes	yes	yes	yes	no	no	yes
SM-Text 64	yes	yes	yes	no	no	no	no	
Smithwriter	no	no	no	no	no	no	no	no
SuperText	yes	yes	yes	no	no	no	yes	no
Textmaster	yes	no	yes	yes	yes	no	no	no
Totl Text 2.6	yes	no	no	yes	yes	no	yes	no
Word Commander 64	yes	no	yes	yes	yes	yes	yes	no
Wordcraft 40	yes	yes	yes	no	yes	no	yes	no
WordManager	yes	yes	yes	yes	yes	no	no	no
Wordpro 3 Plus/64	yes	yes	yes	yes	yes	no	yes	no
Word Processor (Prof)	yes	yes	yes	yes	yes	yes	yes	no
The Word Processor-PCS	yes	yes	yes	yes	yes	no	yes	no
WordProcessor 64	yes	yes	yes	yes	yes	no	yes	yes
Wordsmith 64	yes	no	yes	no	no	yes	yes	no
Word Writer	yes	yes	yes	yes	yes	yes	yes	no
Write Now!	yes	yes	no	no	no	no	no	yes
The Writer's Assistant	yes	yes	yes	yes	yes	no	no	yes

*FOOTNOTES ON PAGE 28

64 (Epson, Gemini 10x, Prowriter, STX-80, MPS-801, etc.). A good word processor will allow you to use a variety of printers. It will also provide the facility for you to use the special character fonts and other functions available with your printer. This is accomplished by sending the appropriate escape sequences to the printer.

DOS commands refer to accessing disk functions such as formatting, initializing, validating diskettes, and obtaining the disk directory. This eliminates the need to exit the program every time you want to perform special disk functions.

Color setup refers to adjusting the screen and background colors to get the most pleasing color combination. Of the 256 possible color combinations on the Commodore 64 screen display, very few allow optimum readability.

TEXT ENTERING

Text entering simply involves typing text onto the monitor screen through the keyboard. Some programs offer special features that make it easier to enter and format text on the screen. For example, a number of programs offer an 80-column screen. Since the video display of the Commodore 64 is restricted to 40 columns (without hardware modification), the 80-column screen is either available by horizontal scrolling or as a special high resolution bit-mapped character set. Other features may be, for example, tab set, which allows you to move quickly to a preset position (horizontally or vertically), and capital lock, which lets you enter text in upper case without using the shift lock key.

SEARCH AND REPLACE FEATURES — Can you:

	—search for a word?	—ignore capitalization during searches?	—search backward?	—use wildcards in the search?	—only search for whole words?	—replace words automatically?	—verify each replacement?	—replace without verify?
3+1	yes	no	no	no	no	yes	yes	no
The Bank Street Writer	yes	no	no	no	yes	yes	yes	no
Better Letter & Writer								
Bliztext 1.1	yes	no	no	no	no	yes	no	yes
Circascript	yes	no	no	no	no	yes	yes	yes
Copy-Writer	yes	no		yes	no	yes	no	yes
C64 Type-Write	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Cut and Paste	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Heswriter	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Homeword	yes	yes	no	yes	no	yes	yes	yes
Insta Writer	no	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Janewrite	yes	yes	no	no	no	yes	no	no
Magic Desk								
Omniwriter	yes	yes	no	yes	no	yes	yes	yes
Paper Clip	yes	yes	no	yes	no	yes	yes	yes
Script 64-PCS	yes	no	no	yes	no	yes	yes	yes
Script 64-Richvale	yes	no	no	yes	no	yes	yes	yes
SM-Text 64	yes	no	no	no	no	yes	yes	yes
Smithwriter	no	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SuperText	yes	no	yes	yes	no	yes	yes	yes
Textmaster	yes	no	no	no	yes	no	n/a	n/a
Totl Text 2.6	yes	no	no	yes	no	no	n/a	n/a
Word Commander 64	yes	no	no	no	no	yes	yes	yes
Wordcraft 40	yes	yes	no	yes	no	yes	yes	yes
WordManager	yes	no	no	yes	no	yes	yes	no
Wordpro 3 Plus/64	yes		no		no	yes	no	yes
Word Processor (Prof)	yes	yes	no	yes	yes	yes	yes	yes
The Word Processor-PCS	yes	no	no	yes	no	yes	yes	yes
WordProcessor 64	yes	no	no	yes	no	yes	no	yes
Wordsmith 64	yes	yes	no	no	no	no	no	no
Word Writer	yes	no	no	yes	no	yes	no	yes
Write Now!	yes	yes	no	no	no	yes	yes	yes
The Writer's Assistant	yes	no	yes	yes	yes	yes	yes	yes

FILE-HANDLING CAPABILITIES — Can you:

	—save text on tape?	—save text on disk?	—initialize a disk?	—get the size of the document you are entering?	—rename a file while entering text?	—get a disk directory while entering text?	—delete a file while entering text?	—rename a file when not entering text?	—delete a file when not entering text?	—get a disk directory when not entering text?	—merge files when not entering text?	Does the program make a backup when you save text?	Does program warn you before overwriting an existing file?
3+1	no	yes	yes	yes	no	yes	yes	no	yes	yes	yes	no	yes
The Bank Street Writer	no	yes	no	yes	no	no	no	yes	yes	yes	no	no	yes
Better Letter & Writer	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	.yes	no	yes
Bliztext 1.1	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	no	yes
Circascript	no	yes	yes	no	no	yes	no	no	no	yes	no	no	no
Copy-Writer	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	no	no	yes
C64 Type-Write	yes	yes	no	yes	no	no	no	yes	no	no	no	no	no
Cut and Paste	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	no	yes
Heswriter	yes	yes	no	yes	no	no	no	no	no	no	yes	no	*1
Homeword	no	yes	yes	yes	no	yes	no	yes	yes	yes	yes	*1	yes
Insta Writer	yes	yes	no	no	no	no	no	no	no	yes	no	no	yes
Janewrite	no	yes	yes	no	yes	yes	yes	yes	yes	yes	no	no	yes
Magic Desk		yes	yes					yes		yes		no	no
Omniwriter	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	no	no
Paper Clip	yes	yes	yes		yes	yes	yes	yes	yes	yes	yes	no	yes
Script 64-PCS	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	no	yes
Script 64-Richvale	yes	yes	yes	yes	yes	yes	no	yes	yes	yes	yes	no	n/a
SM-Text 64	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	no	no
Smithwriter	yes	yes	no	yes	yes	yes	no	yes	yes	yes	yes	no	yes
SuperText	no	yes	yes	yes	no	yes	yes	no	yes	yes	no	no	yes
Textmaster	yes	yes	no	yes	no	yes	no	no	no	yes	yes	no	yes
Totl Text 2.6	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	no
Word Commander 64	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	no	no	yes
Wordcraft 40	yes	Y*2	yes	yes	no	yes		no	no	yes	no	no	yes
WordManager	yes	yes	yes	yes	no	yes	yes	yes	yes	yes	no	no	no
Wordpro 3 Plus/64	no	yes	yes	yes		yes	yes	yes	yes	yes	yes	no	yes
Word Processor (Prof)	no	yes	yes	*3	no	no	no	no	yes	yes	yes	no	*4
The Word Processor-PCS	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	no	yes
WordProcessor 64	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	no	yes
Wordsmith 64	yes	yes	no	no	no	yes	no	no	no	yes	yes	no	no
Word Writer	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	no	yes
Write Now!	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	no	no
The Writer's Assistant	no	yes	yes	no	no	no	no	yes	yes	yes	yes	no	yes

*FOOTNOTES ON PAGE 28

TEXT EDITING

Text editing is one of the primary functions of a word processor. In the text editing mode, you can display a letter or a report on the screen page by page. By using the cursor keys, you can position the cursor on any part of the text. You can move the text around by scrolling it vertically or horizontally (depending upon the particular word processor). Once you have viewed the text, you can modify it by making the appropriate deletions and insertions. You can erase, rearrange, and copy a line or paragraph.

Some state-of-the-art word processing programs offer advanced functions, such as the ability to "search" throughout the text file for specified strings (words or phrases) and "replace" those strings with the corrected ones. You can access all these functions of the text editor in most of the word processors. Each function, however, may require more or less manipulation on your part depending upon the sophistication of the particular program. For example, some word processors make full use of the function keys. You can enter most of the commands by simply striking the appropriate function key, while others require you to memorize the specific commands and type them each time you want to access a specific function.

TEXT OUTPUT

This is the part of the word processor that emulates the functions of a typewriter. It may be considered the most important feature of a word processing program. In the text output mode, you can format your text in exactly the way that you would like to see it printed. In order for you to accomplish this, most word processing programs offer an

	USE PRINTER CAPABILITIES If your printer has the features, can you:										PRINTING CAPABILITIES Can you:								
	—overstrike?	—underline?	—use proportional spacing?	—doublestrike?	—use subscripts and superscripts?	—use italics?	—print compressed characters?	—print double-wide characters?	Can you modify program codes to match your printer?	Is the program set up for printers?	—print any page of a document?	—print a range of pages?	—print multiple copies?	—pause between pages for single-sheet feed?	—chain files during printing?	—pause printing in the middle of a document?	—pause printing to enter text in a document?	—save a format for printing?	—change print format in the middle of a document?
3 + 1	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	no	no	yes	yes	yes	no	yes	yes
The Bank Street Writer	no	no	no	no	no	no	no	no	no	yes	no	no	yes	yes	yes	yes	no	no	no
Better Letter & Writer	yes	yes	yes	yes	yes	yes	yes	yes	yes	no	no	no	no	yes	no	yes	no	no	no
Bliztext 1.1	yes	yes	no	yes	yes	yes	yes	yes	yes	no	yes	yes	no	yes	yes	yes	no	yes	yes
Circascript	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	no	yes	no	yes	yes
Copy-Writer	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	no	yes	yes	yes	no	no	yes	yes
C64 Type-Write	no	no	no	no	no	no	no	no	yes	yes	no	no	no	no	no	no	no	no	no
Cut and Paste	no	no	no	no	no	no	no	no	no	yes	yes	yes	yes	yes	no	yes	no	no	no
Heswriter	no	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes		yes	yes	yes	no	yes	yes
Homeword	yes	yes	yes	yes	yes	yes	yes	yes	yes	*1	*2	*2	no	yes	yes	yes	no	yes	yes
Insta Writer	no	no	no	no	no	no	no	no	no	no	yes	no	no	yes	no	no	no	no	no
Janewrite	yes	yes	yes	yes	yes	no	yes	no	yes	yes	yes	yes	yes	yes	no	no	no	yes	no
Magic Desk																			
Omniwriter	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	no	no	yes	yes	yes	yes	yes	yse
Paper Clip	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	no	yes	yes
Script 64-PCS	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	no	yes	yes
Script 64-Richvale	yes	yes	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	no	yes	yes
SM-Text 64	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	no	yes	yes	no	no	no	no
Smithwriter	no	yes	yes	yes	yes	yes	yes	yes	no	yes	yes	yes	no	no	no	no	no	no	no
SuperText	yes	yes	no	yes	yes	yes	yes	yes	yes	yes	no	no	yes	yes	yes	yes	no	yes	yes
Textmaster	no	no	no	no	no	no	yes	yes	yes	yes	no	no	no	yes	yes	no	no	no	no
Totl Text 2.6	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Word Commander 64	yes	yes	no	yes	yes	yes	yes	yes	yes	yes	no	no	no	yes	yes	no	no	yes	yes
Wordcraft 40	no	yes	no	yes	no	no	*2	*2	yes	yes	yes	yes	yes	yes	no	yes	no	yes	yes
WordManager	no	yes	yes	no	no	no	no	no	no	yes	no	no	no	yes	no	yes	no	yes	no
Wordpro 3 Plus/64	yes	yes	no	yes	yes	yes	yes	yes	yes	yes	no	no	yes	yes	yes	yes	no	yes	yes
Word Processor (Prof)	yes	yes	yes	yes	yes	yes	yes	yes	yes	*3	yes	yes	yes	yes	yes	yes	yes	yes	yes
The Word Processor-PCS	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	no	yes	yes
WordProcessor 64	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Wordsmith 64	no	no	no	no	no	no	no	no	no	yes	no	no	no	no	yes	yes	no	no	yes
Word Writer	yes	yes	yes	yes	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	no	no
Write Now!	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
The Writer's Assistant	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	no	no	yes	yes	yes	yes	no	yes	yes

*FOOTNOTES ON PAGE 28

array of features. For example, you can set page length (lines), page width (columns), and left and right margins. You can align your text left or right justified, and you can also center portions of the text between margins. Some word processors offer advanced features such as automatic page numbering, headers, footers, and forced pagination. You can also send control codes to the printer for accessing alternate character fonts and special printer functions like underlining, boldfacing, superscripts, subscripts, etc.

FILE HANDLING

Once you have typed your text into the word processor, you can save it on a disk or cassette in the form of files. These files may be recalled whenever you want to view, modify, or print them. In addition to storing and retrieving these files, some word processors include some useful file facilities, such as the ability to link a number of files to form one long document, or insert information from one file (fill file or merge) into another. These file facilities enhance the usefulness of the program and broaden its applicability.

SPECIAL FEATURES

In addition to the features mentioned above, a particular word processor may offer special features that make it outstanding when compared to others. For example, *Wordpro3 Plus* by Professional Software offers an alternate screen which can be used to list the disk directory or load a second file that you want to simultaneously view or edit. *Easy Script* by Commodore offers from 40 to 260 col-

	TEXT DISPLAY FEATURES										PRINT SPACING CAPABILITIES Can you:									
	Does the program show page and line counters onscreen?	How many 40-character lines show onscreen?	Is there a menu of commands during text entry?	Can you turn off the command menu to show more text?	Do lines longer than 40 characters wrap onscreen?	Can program show: —lines > 40 characters onscreen?	—a 40-column window over text formatted > characters?	—a virtual representation of printed text onscreen?	Can you save commonly used screen formats?	Does the program support 80-column hardware?	—set top, bottom, left, and right margins?	—set line spacing?	—set the number of lines per page?	—automatically number pages?	—put page numbers anywhere at the top or bottom of the page?	—put a header on each page?	—put a footer on each page?	What is the maximum number of characters in a printed line?	Can you print in two columns?	Can you right justify text?
3 + 1	yes	22	no		no	yes	yes	no	no	no	yes	no	yes	yes	*6	no	no	77	yes	yes
The Bank Street Writer	no	18	yes	no	no	no	no	no	no	no	yes	yes	yes	yes	yes	no	no	126	no	no
Better Letter & Writer	yes		yes	no	yes	no	yes	yes			yes	yes	yes	no	n/a	no	no	255	yes	yes
Bliztext 1.1	no	25	no	no	yes	yes	yes	no	yes	no	yes	yes	yes	yes	no	yes	yes	255	yes	yes
Circascript	no	24	no	n/a	yes	no	no	no	yes	no	yes	yes	yes	yes	no	yes	no	256	no	yes
Copy-Writer	no		no	n/a	yes	yes	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	*1	yes	yes
C64 Type-Write	no	20	no	n/a	no	no	no	no	no	no	no	no	no	no	n/a	no	no	72	no	no
Cut and Paste	no	22	yes	no	yes	yes	no	no	yes	no	yes	yes	yes	yes	no	yes	no	*2	no	no
Heswriter	yes	40	no	no	no	no	no	yes	yes	no	yes	yes	yes	no	yes	no	no	40	no	yes
Homeword	yes	15	no	no	yes	yes	no	yes	yes	no	yes	yes	yes	yes	yes	yes	yes	100	yes	yes
Insta Writer	yes	20	no	no	yes	no	no	no	yes	no	*4	no	no	no	n/a	no	no	75	no	no
Janewrite	no	22	yes	yes	no	yes	yes	yes	no	no	*3	yes	yes	yes	yes	yes	no		no	yes
Magic Desk	no		yes	no	yes	no	no	no		no	*4									
Omniwriter	yes		no	no	yes	no	yes	no	yes	no	yes	yes	yes	yes	yes	yes	yes	*2	yes	yes
Paper Clip	yes	23	no	no	no	no	yes	yes	yes	yes	*4	yes	yes	yes	yes	yes	yes		yes	yes
Script 64-PCS	yes	30	yes	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	80	no	yes
Script 64-Richvale	no	22	yes	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	*5	yes	yes
SM-Text 64	yes	20	yes	yes	yes	no	yes		no		yes	no	yes	no	n/a	no	no	120		yes
Smithwriter	yes		yes	no	yes	yes	no	no	no		yes	yes	yes	yes	yes	no	no	132	yes	no
SuperText	no		yes	yes	yes	yes	yes	yes	yes	no	yes	yes	yes	yes	yes	yes	yes	160	no	yes
Textmaster	yes	22	no	no	no	no	no	no	no	no	yes	yes	yes	no	no		no	79	yes	yes
Totl Text 2.6	no	22	no	n/a	yes	no	no	no	no	yes	yes	yes	yes	yes	no	yes	yes	255	no	yes
Word Commander 64	no	25	no			yes	yes	yes	yes	no	yes	yes	yes	yes	yes	yes	yes	132	no	yes
Wordcraft 40	yes	22	no	n/a	yes	no	yes	yes	yes		yes	no	yes	no	n/a	no	no	117	no	yes
WordManager	yes	25	no	n/a	no	yes	yes	yes	yes	yes	*4	no	no	no	yes	no	no	80	yes	yes
Wordpro 3 Plus/64	*1		no	n/a	no	no	no	no	yes	no	yes	yes	yes	yes	yes	yes	yes	132	no	yes
Word Processor (Prof)	yes	17	yes	no	yes	yes	no	yes	yes	no	yes	yes	yes	yes	*6	yes	yes	255	no	yes
The Word Processor-PCS	yes		no	n/a	no	yes	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	80	no	yes
WordProcessor 64	*1		no	n/a	yes	yes	yes	yes	yes	no	yes	yes	yes	yes	yes	yes	yes	160	yes	yes
Wordsmith 64	no	22	no	n/a	yes	no	no	no	no	yes	*4	yes	yes	no	n/a	no	no	80	no	yes
Word Writer	yes	22	no	n/a	no	no	yes	yes	yes		yes	yes	yes	yes	*6	no	no	*2	no	yes
Write Now!	yes	24	no	n/a	yes	yes	no	yes	yes	no	yes	yes	yes	yes	yes	yes	yes	254	no	yes
The Writer's Assistant	yes	22	no	n/a	yes	no	no	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	*2	yes	yes

*FOOTNOTES ON PAGE 28

umns of text screen that can be used to create data tables and other items of that nature.

GLOSSARY

The following section is provided to assist you in understanding the terms frequently used in manuals accompanying word processing programs. Some of these terms have also been used in our descriptions of the individual programs.

AUTOSCROLL: Refers to the automatic scrolling of your text file by the program. The scrolling may be horizontal or vertical. This is convenient if you want to quickly view the whole or a part of the text or want to go to a specific part of the text.

BLOCK OPERATIONS: Some word processors allow you to perform certain editing operations on blocks of text instead of one word or line at a time. These operations are collectively referred to as block operations. You may specify the range of a block (a few words, lines, or paragraphs) and then the program will perform the desired operation on that specified range. Examples of block operations are block-delete, block-copy, block-move, etc.

TEXT ENTRY FEATURES

	Can a single document be larger than memory?	How much memory is available after the program is loaded?	Are there separate text entry and edit modes?	Must text be entered in blocks? How many characters long?	Is there an overtype mode?	Is there an insert mode?	Limit on the number of characters that can be inserted?	Can you insert blank lines?
3 + 1	no	7.5k	no	no	no	no	*6	yes
The Bank Street Writer	yes	3200 words	yes	no	no	no	no	yes
Better Letter & Writer	no		yes	no	yes	yes	no	yes
Bliztext 1.1	yes	26k	no	no	no	yes	no	yes
Circascript	no	38k	no	no	no	no	no	yes
Copy-Writer	yes		no	no	yes	yes	no	yes
C64 Type-Write	no	28k *1	yes	no	yes	yes	no	no
Cut and Paste	no	5200 words	no	no	yes	yes	yes	yes
Heswriter	no	16k	yes	yes	yes	yes	40	yes
Homeword	no	4 pp.	yes	no	yes	yes	no	yes
Insta Writer	no	4 pp.	no	5k	yes	yes	no	yes
Janewrite	yes		no	no	yes	yes	no	yes
Magic Desk	no		no		yes	yes		
Omniwriter	yes	30k	no	no	yes	yes	no	yes
Paper Clip	500 + no	lines	no	no	yes	yes	no	yes
Script 64-PCS	no	999 screens	no	no	yes	yes	no	yes
Script 64-Richvale	yes	35k	no	35k	yes	yes	no	yes
SM-Text 64	*2	20k	no	no	yes	yes	no	yes
Smithwriter			yes			yes	yes	yes
SuperText	*3	10k	yes	no	yes	yes	no	yes
Textmaster	no	500 + lines	no	20k	yes	yes	240	yes
Totl Text 2.6	no	21k	no	255	yes	yes	no	yes
Word Commander 64	no	28k	no	no	no	yes	no	yes
Wordcraft 40	no	25k	no	no	yes	yes	no	yes
WordManager	no	5 pp.	yes	no	yes	yes	no	yes
Wordpro 3 Plus/64	yes		no	no	yes	yes	no	yes
Word Processor (Prof)	no	16k	no	no	yes	yes	no	yes
The Word Processor-PCS	yes		no	no	yes	yes	no	yes
WordProcessor 64	no	16k	no	no	yes	yes	no	yes
Wordsmith 64	yes	11k	no	no	yes	yes	*7	yes
Word Writer	yes	50k	no	no			255	yes
Write Now!	yes	30k *1	no	no	yes	yes	no	yes
The Writer's Assistant	no		no	no	yes	yes	no	yes

*FOOTNOTES ON PAGE 28

CAPITAL LOCK: In this mode, all the alphabetic characters that you type on the screen will appear in upper case. This is the same as shift-lock except that in the shift-lock mode all other function and numeric keys are also in the shift mode.

DATABASE INTERFACE: The facility that allows a word processor to read sequential files created by a database management program. These files may be edited in the word processing mode or merged with text files created on the word processor.

DECIMAL TABULATION: Lets you enter a series of numbers and align the decimal. It is also often referred to as numeric code.

DOS COMMANDS: Some word processors let you perform disk operations without having to exit the program. This feature is time-saving and very convenient. You can display the disk directory, load and save files from the directory, scratch unwanted files from the disk, and copy certain files for backups.

FILE: A file is a text or document that is stored under a unique name on disk or tape. For example, if you store a section of your manuscript under the title "Chapter 1", then Chapter 1 will be considered a text file. This file may be merged with other files if your word processor program has merge capabilities.

FORCED PAGING: Instructs the printer to go to the top of the next page and resume printing the text.

FORMATTED OUTPUT TO SCREEN: Lets you look at the text on the monitor screen exactly the way it would be printed on paper. This way you can make final changes in the formatting of your text before you actually print it on paper.

GLOBAL SEARCH & REPLACE: The editor in some word processing programs is capable of searching for specific text strings (words or phrases) throughout the text file. The text string may be a misspelled word or name that you would like to correct. Using the global search and replace feature, you can instruct the editor to replace the text string with the corrected version, and the editor will automatically go through the entire file and replace that string. This can save hours of editing time if you have a manuscript of 100 pages and you want to replace a name or correct a consistently misspelled word.

HELP MENU: The help menu may consist of helpful hints on possible responses that you may make, a list of system commands, the operating mode that you are currently working in, etc. It is displayed by the program when you forget the commands or subsequent steps that you need to go through to execute an operation.

HORIZONTAL SCROLL: The video display of the Commodore 64 is restricted to 40 columns (without hardware

modification). Some programs overcome this slight disadvantage by allowing you to scroll the text horizontally. Although at any time you only see 40 columns of the text, you can still create it in an 80-column format.

LINE SPACING: Similar to a typewriter, word processors are also capable of printing text with a specified number of blank lines between the text lines. You may choose, for example, double line spacing and all the text will be printed with two blank lines between the text lines. Line spacing is especially useful for formatting text for editing purposes.

LINKING FILES: Refers to the process of printing a number of text files sequentially from disk to create larger printed documents. Since it is easy to work with smaller files while editing, with this feature you can create several small files and later print them consecutively to create a large document.

MAIL MERGE: A special feature available in some word processors that allows you to merge names and addresses of people in your mailing list with a standard form letter to create personalized letters. The most common application is creating personalized form letters by merging mailing address files (on your database) with a standard letter file on your word processor. (Available on most word processors.)

OTHER FEATURES
Can you:

	—undo the last command?	—use a modem while the program is running?	—automatically create footnotes?	Is a spelling checker available?	Cost?	Is a mail merge program available?	Cost?	What language is the program writeen in?	Is the program copyable?	Is the source code available?
3+1	yes	no	no	no		yes	incl.	machine	no	no
The Bank Street Writer	no	no	no	no		no		machine	no	no
Better Letter & Writer	no	no	no					BASIC + ML	yes	yes
Bliztext 1.1	no	yes	yes	yes		yes	49.00	machine	no	no
Circascript	yes		no	no		no		machine	yes	no
Copy-Writer			no	no		yes	incl.	Fourth	yes	no
C64 Type-Write	no	no	no	no		no		BASIC	yes	yes
Cut and Paste	no	no	no	no		no		assembly	no	no
Heswriter	no	no	no	no		no			no	no
Homeword	yes	no	no	yes	49.95	no		assembly	no	no
Insta Writer	no	no	no	no		yes	31.95	machine	no	no
Janewrite	no	no	no	no		no		machine	yes	no
Magic Desk									no	no
Omniwriter	no	no	no	yes	incl.	yes	incl.	machine	no	no
Paper Clip	yes	yes	no	yes	59.95	yes	99.95	machine	yes	no
Script 64-PCS	yes	yes	yes	yes	incl.	yes	incl. *1	assembly	yes	no
Script 64-Richvale	no	yes	no	yes	incl.	yes	incl.	machine	yes	no
SM-Text 64	no		no	no		yes	35.00	Compiled BASIC	yes	no
Smithwriter	yes	no	no	no		yes	incl.		no	no
SuperText	no	no	no	yes		no		assembly	no	no
Textmaster	no	no	no	no		no			yes	yes
Totl Text 2.6	yes	no	yes	yes	35.00	yes	20-24	BASIC + ML	yes	yes
Word Commander 64	no	no	no	yes		yes	39.95	assembly	no	no
Wordcraft 40	yes		no	no		yes	incl.	machine	no	no
WordManager	yes	no	no	no		yes	incl.	machine	yes	no
Wordpro 3 Plus/64	no		yes	yes	59.95	Y*2		machine	no	no
Word Processor (Prof)	no	no	no	yes	incl.	Y*2	89.95	assembly	no	no
The Word Processor-PCS	yes	yes	yes	no		yes	incl. *1	assembly	yes	no
WordProcessor 64	yes	yes	no	yes	49.95	yes	$50 *7	machine	no	no
Wordsmith 64	yes	no	no	no		yes	incl.	BASIC + ML	no	no
Word Writer	yes	no	no	yes	incl.	yes		machine	no	no
Write Now!	*3	no	yes	yes	39.95	yes	39.95	machine	no	no
The Writer's Assistant	no	no	no	yes	incl.	yes	incl. *4	Compiled BASIC	yes	no

*FOOTNOTES ON PAGE 28

MENU-DRIVEN: A program may be considered menu-driven if the various options presented by the program may be selected from a menu. In many programs, the menus are developed in a branching fashion with the master menu (or main menu) branching off to a number of sub-menus, each of which branches off to more sub-menus, depending upon the complexity of the program and the array of options available.

MERGE: This facility often associated with word processing refers to merging text files on your diskette. One file may be placed at the beginning, end, or in the middle of another file.

PAGE NUMBERING: Some word processing programs will automatically print page numbers on your document at the top or bottom of the page at the specified margin or in the center.

SELECTIVE PAGE PRINTING: The ability of a word processor program to print specified portions of text instead of the whole text file. This is a very useful feature when one page in the middle of a long document is torn or lost.

SPELLING CHECKER: Refers to the utility programs available with some word processors which, when executed, will check the spelling of words in a specified text file, compare those spellings to those in the program dictionary, and suggest errors to you. Most often, they can also correct the spelling once you have approved the suggestion.

SUPPORT PRINTER CODE: Some word processors will let you send control codes (ASCII codes) to your printer through the program. This allows you to select alternate character fonts and other special printer functions such as boldface, underline, italics, etc. For example, in the Gemini 10x printer, sending the control codes 27 66 3 will cause your text to be printed in condensed print mode.

TABS: Tabs in a word processor are used in a manner similar to tabs on a typewriter. They refer to the vertical, and in some cases horizontal, positions where you want the cursor to move next or where you want to begin entering the text.

TEXT: Any information that you type into your computer, whether it is a letter or any other kind of manuscript, is referred to as text.

WORD PROCESSOR: A program or a collection of programs that allow you to use your microcomputer to enter, edit, store, and print text.

80 COLUMNS: A reference to the number of columns displayed on the monitor screen. The Commodore 64 has a 40-column video display. With some hardware or software modifications, however, we can create an 80-column display.

FOOTNOTES

Word Processing Programs
*1 Defective disks replaced free; user-damaged disks replaced for $5.00.
*2 Disk and tape come in one package.
*3 Lifetime of disk.
*4 Depends on upgrade.
*5 Free with purchase of 80-column board.
*6 No upgrades planned.

Documentation
*1 Tutorial on disk.
*2 Help file on disk and tutorial on tape with transcript.
*3 In next revision.
*4 Manual is tutorially structured.
*5 Only in setup.
*6 Two, but only with supporting software.
*7 No, but program comes with keyboard overlays.

Text Entry Features
*1 Shows amount of memory available for entering text.
*2 Document is broken into pages by user; pages are stored as separate files which can be linked for editing and printing.
*3 Link feature allows you to do all functions to any number of files; approximates unlimited file size.
*4 Audible keystroke option.
*5 Certain keyboard characters are definable.
*6 Page size.
*7 To end of line.

Delete Features
*1 Can delete paragraphs.
*2 Can use the 'cut' command.
*3 Requires two commands.

Onscreen Formatting Capabilities
*1 Imbedded, yes; automatic, no.
*2 Has format for four-level outlines.
*3 Shows page and line of cursor.
*4 Must be done in spreadsheet program.
*5 Must be done in file manager program.
*6 On printing.

Text Display Features
*1 Line and column.

Block Features
*1 Equal to available memory.
*2 Unlimited.
*3 One screen.
*4 At end only.
*5 Can also move columns horizontally.
*6 Equal to size of document.
*7 Blocks can be moved, but not deleted.

File-handling Capabilities
*1 User's choice.
*2 Can also save encrypted files.
*3 No, but page and line counters are displayed.
*4 Cannot do so.
*5 Files can be converted to work on other word processors.

Print Spacing Capabilities
*1 No limit.
*2 Printer dependent.
*3 Top and bottom.
*4 Left and right
*5 128 justified; unlimited otherwise.
*6 Bottom only

Printing Capabilities
*1 Comes with 100 ready-to-print personal letters.
*2 Update will have these features.

Use Printer Capabilities
*1 Set up for a Cardco printer interface.
*2 All text must be compressed or double wide.
*3 Includes a set up program to be run only once.

Other Features
*1 This is a 200-record database
*2 Programs also available from other companies
*3 Yes, most functions.
*4 Word processor can be integrated with spreadsheet and database.
*5 Package includes word processor, spreadsheet, file manager, and graphing program.
*6 Available with built-in spelling checker.
*7 Will do form letters from list data without any external merge program.

MANUFACTURERS LISTING

3+1
Commodore Business Machines
1200 Wilson Drive
West Chester, PA 19380
(215)431-9100
Cartridge

64 Text
Computermat Software
P.O. Box 1664
Lake Havasu City, AZ 86403

The Bank Street Writer
Broderbund Software
17 Paul Drive
San Rafael, CA 94903
(415)479-1170
$69.95 disk

The Bank Street Writer
(school version)
Scholastic, Inc.
730 Broadway
New York, NY 10003
$95.00 three disks, teacher's manual, student user's guide

Better Letter & Writer
Softron, Inc.
150 Nassau Street, Suite 2024
New York, NY 10038
(212)608-2922
$34.95 disk

Bliztext
Hofaker
53 Redrock Lane
Pomona, CA 91766
(714)623-8314
$89.00 disk or tape

Busiwriter 64
(Now published as *Omniwriter* by Hes)
Skyles Electric Works
231-E South Whisman Road
Mountain View, CA 94041

Circascript
Circadian Software, Inc.
575 S. Wickham Road, Ste. 1
Melbourne, FL 32901
(305)676-5822
$39.95 disk

Copy-Writer
CGRS Microtec, Inc.
P.O. Box 102
Langhorne, PA 19047
(215)757-0284
$79.95 disk

The Critic
The Quantum Leap
4214 Arden Way
San Diego, CA 92103
(619)297-1078
$40 disk

C-64 Type-Right
RAK Electronics
P.O. Box 1585
Orange Park, FL 32067-1585
(904)264-6777
$7.95 tape, $10.95 disk

Cut and Paste
Electronic Arts
2755 Campus Drive
San Mateo, CA 94403
(415)572-2787
$50.00 disk

Easy Script
Precision Software, Inc.
1675 York Avenue, Suite 11D
New York, NY 10128
(212)410-34318
$99.00 disk

Easy Script 64
Commodore
1200 Wilson Drive
West Chester, PA 19380
(215)431-9100

HesWriter 64
Hesware
150 North Hill Drive
Brisbane, CA 94005
(415)468-4111
(800)624-2442
$39.95 cartridge

HomeWord
Sierra On-Line, Inc.
Sierra On-Line Building
Coarsegold, CA 93614
(209)683-6858
$69.95 disk

Home Writer
Micro Lab, Inc.
2699 Skokie Valley Road
Highland Park, IL 60035

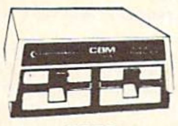
Insta Writer
Cimarron Software
Microsci Corporation
2158 S. Hathaway Street
Santa Ana, CA 92705
(714)241-5600
$51.95 cartridge

Continued on page 93

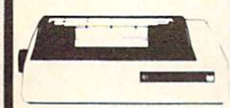
NEW 128K COMMODORE - 80 COLUMN

COMPUTER SYSTEM SALE!

HOME • BUSINESS • WORD PROCESSING



8050
Dual Disk Drive
1 Mega Byte



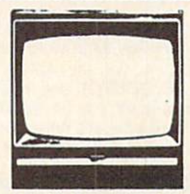
100 CPS
4023 Printer

$1195⁰⁰

(If ordered before 9/1/84 only $1095)



B128 Computer
128 K



12" Hi Res Monitor

List Price $4008.95

LOOK AT ALL YOU GET FOR ONLY ***$1195***

	LIST PRICE
• B128 COMMODORE 128K 80 COLUMN COMPUTER	995.00
• 8050 DUAL DISK DRIVE (over 1 million bytes)	1795.00
★ 4023 - 100 CPS - 80 COLUMN BIDIRECTIONAL PRINTER	499.00
• 12" HI RESOLUTION 80 COLUMN GREEN OR AMBER MONITOR	249.00
• SUPER SCRIPT 80 COLUMN PROFESSIONAL WORDPROCESSOR	149.50
• SUPER BASE PROFESSIONAL DATA BASE	149.50
• BOX OF 10 LORAN LIFETIME GUARANTEED DISKS	49.95
• 1100 SHEETS FANFOLD PAPER	19.95
• ALL CABLES NEEDED FOR INTERFACING	102.05
TOTAL LIST PRICE	**4008.95**

SALE PRICE $1195.00

Printer replacement options (replace the 4023 with the following at these sale prices)

	LIST	SALE
★ Olympia Executive Letter Quality Serial Printer/Typewriter	849.00	**499.00**
★ Comstar Hi-Speed 160 CPS 15½" Serial-Business Printer	779.00	**449.00**

Plus You Can Order These Business Programs At Sale Prices

	LIST	SALE		LIST	SALE
ACCOUNTS RECEIVABLE	149.95	**99.00**	INVENTORY	149.95	**99.00**
ACCOUNTS PAYABLE	149.95	**99.00**	GENERAL LEDGER	149.95	**99.00**
PAYROLL	149.95	**99.00**			

15 DAY FREE TRIAL We give you 15 days to try out this SUPER SYSTEM PACKAGE!! If it doesn't meet your expectations, just send it back to use prepaid and we will refund your purchase price!!
90 DAY IMMEDIATE REPLACEMENT WARRANTY If any of the SUPER SYSTEM PACKAGE equipment or programs fail due to faulty workmanship or material we will replace it IMMEDIATELY at no charge!!

Add $50.00 for shipping and handling!!
$100.00 for Canada, Puerto Rico, Hawaii orders.
WE DO NOT EXPORT TO OTHER COUNTRIES.
Enclose Cashiers Check, Money Order or Personal Check. Allow 14 days for delivery, 2 to 7 days for phone orders, 1 day express mail! Canada orders must be in U.S. dollars. We accept Visa and MasterCard. We ship C.O.D. to U.S. addresses only.

PROTECTO
ENTERPRIZES (WE LOVE OUR CUSTOMERS)
BOX 550, BARRINGTON, ILLINOIS 60010
Phone 312/382-5244 to order

Reader Service No. 66

COMMODORE 64
(more power than Apple II at half the price)

$99.50*

- 170K DISK DRIVE $159.00*
- TRACTION FRICTION PRINTER $79.00*

COMPUTER AND SOFTWARE SALE

WE HAVE THE BEST SERVICE

WE HAVE THE LOWEST PRICES

VIC-20
(a real computer at the price of a toy)

$79.50

- COM-64 POWER FOR VIC-20 $79.00
- NEW VOICE SYNTHESIZER $59.00 (Com-64 or VIC-20)

* COMMODORE 64 COMPUTER $99.50
You pay only $199.50 when you order the powerful 84K COMMODORE 64 COMPUTER! LESS the value of the SPECIAL SOFTWARE COUPON we pack with your computer that allows you to SAVE OVER $100 off software sale prices!! With only $100 of savings applied, your net computer cost is $99.50!!

*170K DISK DRIVE $159.00
You pay only $259.00 when you order the 170K Disk Drive! LESS the value of the SPECIAL SOFTWARE COUPON we pack with your disk drive that allows you to SAVE OVER $100 off software sale prices!! With only $100 of savings applied, your net disk drive cost is $159.00.

* TRACTION FRICTION PRINTER $79.00
You pay only $179.00 when you order the Comstar T/F deluxe line printer that prints 8 1/2 x 11 full size, single sheet, roll or fan fold paper, labels etc. 40, 66, 80, 132 columns. Impact dot matrix, bi-directional, 80 CPS. LESS the value of the SPECIAL SOFTWARE COUPON we pack with your printer that allows you to SAVE OVER $100 off software sale prices!! With only $100 of savings applied your net printer cost is only $79.00.

4 COLOR PRINTER/PLOTTER $99.00
Lowest cost, 4 color, 80 column, letter quality PRINTER/PLOTTER for Com-64 or VIC-20 computers!! List programs. High resolution graphics for charts and geometric figures. INCLUDES INTERFACE AND SPECIAL SOFTWARE SAVINGS COUPON!!

80 COLUMN BOARD $99.00
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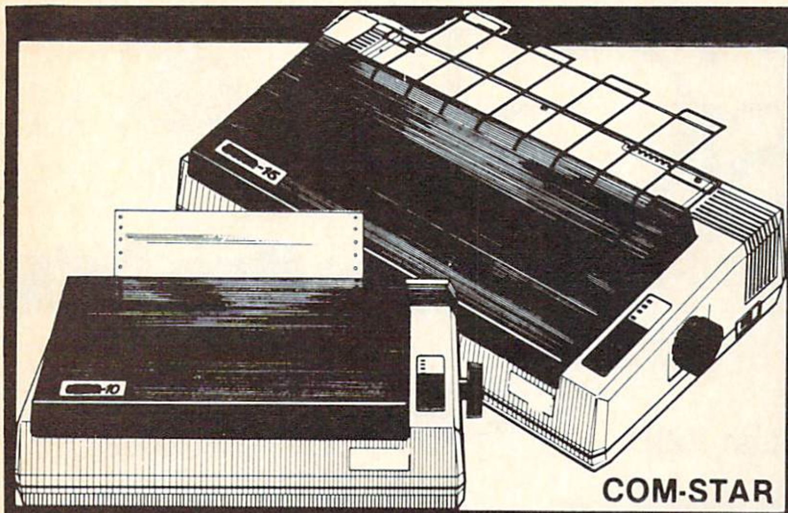
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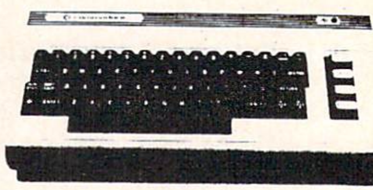
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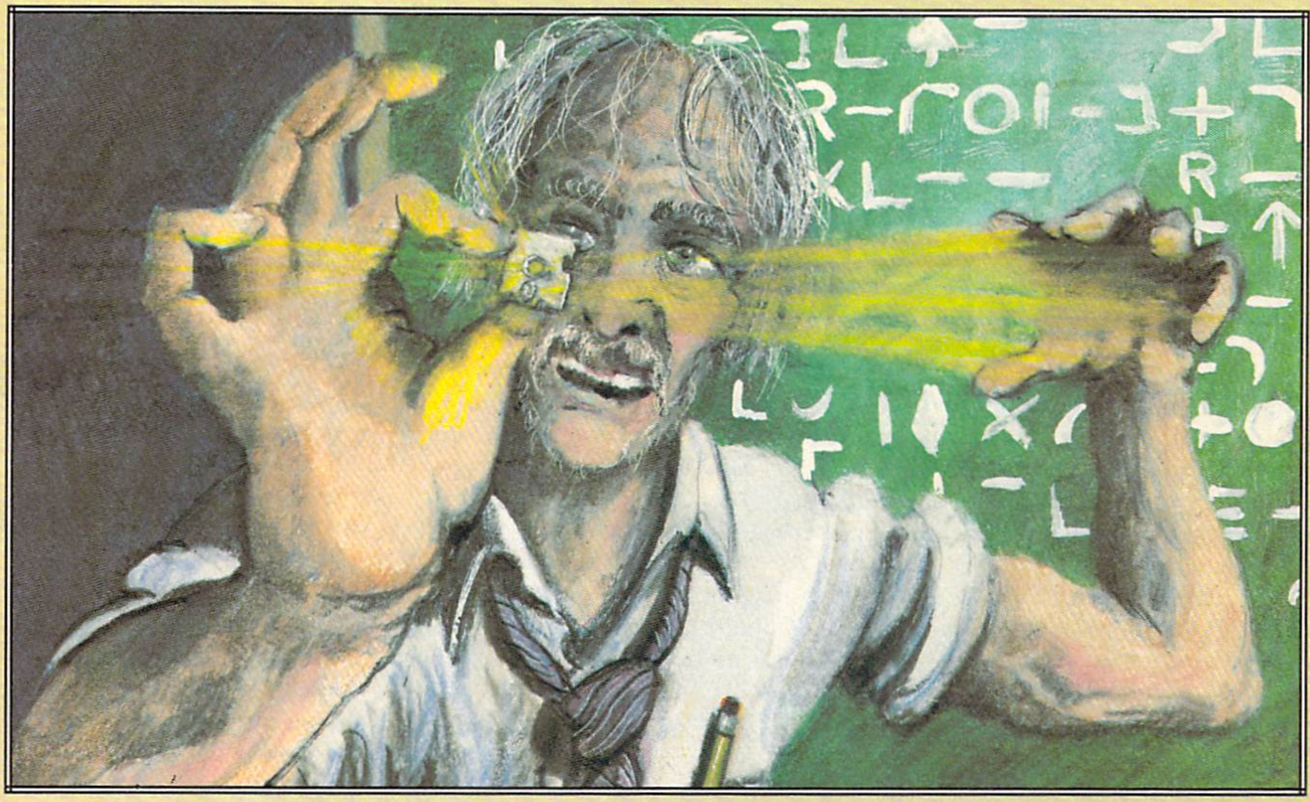
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Computational Wizardry



The Magic of Computation-Crunching

by Dale Rupert

After more than 32 hours of computation time, the Cray-1 computer revealed the three factors of the 69-digit number equal to one less than two raised to the 251st power. This number was thought by the 17th-century mathematician and theologian Marin Mersenne to be a prime number, one having no factors except itself and one. The Cray-1 supercomputer, with speeds measured in millions of calculations per second, showed that this Mersenne number is not prime.

This month we will dust some of the cobwebs out of the number-crunching circuitry of our Commodore computers, and see if we can at least verify the work of the mighty Cray-1 computer. Since our microcomputers are probably rated at a few hundred floating-point operations per second ("flops"), we can't truly re-create the work of the multi-megaflop rated Cray unless we have a few million spare hours. (If you do, go right ahead!)

Just out of curiosity, let's determine the megaflop rating of our computer. The following program gives a rough idea of the number of floating-point multiplications per second the Commodore can perform. Actually, it is more a measure of the speed of BASIC rather than the ultimate speed of the computer itself. A similar program written in optimized machine code would be a truer test of the computer's maximum rating. But since most of our work is

done in BASIC, this program may be revealing:

```
5 REM << MEGAFLOPS >>
10 TA=TI : REM START TIME
20 FOR N=1 TO 1000:A=N*N:NEXT
30 TB=TI : REM END TIME
40 TT=(TB-TA)/60 : REM SECONDS
50 FLOP=1000/TT
60 PRINT FLOP "FLOPS"
70 PRINT FLOP/1E6 "MEGAFLOPS"
```

The variable TI stores the number of jiffies (sixtieths of a second) that have elapsed since the computer was turned on. Line 10 stores the initial value of TI. Line 20 is the actual test, where N is multiplied by itself 1000 times. The final time is stored in TB, and the total time in seconds (TT) is calculated in line 40. Since the program performed 1000 floating-point multiplications, the number of floating-point operations per second (FLOP) is 1000/TT in line 50. If we divide that number by one million (1E6) as shown in line 70, we get the number of megaflops for our computer.

My results were a meager 184 flops or roughly 0.0002 megaflop. On the other hand, my Commodore computer cost significantly less than $15 million —not to mention the savings on my electric bill compared with that of the Cray-1!

All in all, our microcomputers are capable of some very impressive number-crunching. They are snails compared to the "big boys," but they have the perseverance and ability to put pencil-and-paper methods and even calculators to shame.

UNLIMITED QUOTIENTS

Do you know the thirty-fifth decimal digit of the fraction 8/9? Do you suppose your Commodore computer would be able to figure it out? A little bit of long division with paper and pencil is all it should take to calculate the result (if you don't already know the answer). Let's start out by teaching the computer how to do extended division.

The following short program performs a limited form of long division. The two numbers which are divided must not have more than nine digits each or the results will not always be exact. Still, this program will find exactly the thirty-fifth (or any, for that matter) decimal place of 8/9 or even of 888888/9000001.

```
10 REM ////////////////////////////
20 REM /   UNLIMITED QUOTIENT     /
30 REM ////////////////////////////
40 INPUT "X,Y";X,Y
50 Q=INT(X/Y)
60 PRINT X;"/";Y;" = ":PRINT
70 PRINT Q;".";
80 X=10*(X-Y*Q)
90 Q=INT(X/Y)
100 PRINT MID$(STR$(Q),2);
110 GOTO 80
```

Line 40 gets the numbers to be divided. The whole number part of the quotient is found in line 50. The results and the decimal point are printed in lines 60 and 70. Line 80 multiplies the whole number part of the quotient Q by the divisor Y. This is subtracted from the original dividend X and the result is multiplied by 10. Line 90 again finds the whole number (integer) part of the quotient, and line 100 prints that number. Line 110 returns to repeat the process until the point when the RUN/STOP key is pressed.

The PRINT statement first converts Q to a string value and then takes only the digit itself by means of the MID$ function. Recall that the number Q would be printed with a leading space (since it is positive) and a trailing space. By using this MID$ function, we eliminate the spaces between the digits as we print them.

This division is performed in a manner similar to long division by hand. If you divide 9 into 8.000000, the result is 0 with a remainder of 8. Next you multiply the remainder by 10 (the same as dropping the first 0 down beside the remainder). Then you divide 80 by 9 with a result of 8 and a remainder of 8. Bring down another 0 and repeat the process *ad infinitum.* Fortunately the computer doesn't tire of doing this, and will happily print out decimal places as long as you let it.

How long should you allow the process to continue? The decimal result of the division of two integers X/Y will always repeat itself after (Y-1) decimal places or fewer. This is not difficult to see if you consider that each remainder must be less than Y. Consequently there are always fewer than Y different quotients possible. Some divisors such as 3 and 6 produce repetitions after one digit. Others such as 7 and 17 produce repeating fractions of the maximum lengths (6 and 16 respectively).

For a good programming challenge, you might add to this program the ability to determine when the decimal has begun repeating and to indicate what the repeating part is. For example, if X=2 and Y=110, the quotient is 2/110=0.0181818. . .and the repeating part is 18.

LENGTHY MULTIPLICATION

The preceding program used the computer's own division routine. It was consequently limited to using numbers of nine digits or fewer, since the computer handles only that many digits of precision. If we want to work with the sixty-nine digit number mentioned at the beginning of this article, we will have to synthesize our own mathematical operations.

We will still use the computer's internal routines, but we must break the large numbers into small enough portions that the computer's computation on them is exact. The *Lengthy Multiplication* program on page 79 allows the user to enter two integers with a total of almost 80 digits, and their product is calculated and printed. The input routine must be revised to accommodate numbers with more than 80 combined digits, but that will not be difficult. Turn to page 79 and look at *Lengthy Multiplication.*

The program is written in a modular form. Some of the subroutines will be useful in our next program. Also, a program in this format is relatively easy to understand and to modify. The main body of the program is a sequence of subroutine calls. The purpose of each subroutine is clearly identified.

The subroutine at line 200 asks the user to enter two numbers. They are entered as string quantities so we may store them exactly. The initialization routine at line 300 sets up three numeric arrays. Each element of each array will be a single numeric digit. A( ) and B( ) store the digits of A$ and B$. The D( ) array will store their product.

The digits of A$ and B$ are stripped off one by one and stored in arrays A( ) and B( ) by the subroutine at line 400. The subroutine at line 600 takes the results of the multiplication which are in D( ) and prints them one at a time. That subroutine ignores any leading zero, if there is one, in line 600. Line 630 determines where commas should be placed within the answer and puts them there. We'll look at those details a bit later.

The heart of the program is the subroutine at line 500. It first fills the D( ) array with zeroes. Then it steps through B( ), multiplying all digits in A( ) by each digit of B( ). It stores each digit of the result in D( ).

Two functions, FNU and FNC, perform the magic of determining the units (or ones) digit and the carry (or tens) digit of each product. These functions are defined in the initialization lines 330 and 340. The units digit is stored in the current element of D( ) and the carry digit is put into the next larger element of D( ) in lines 550 and 560.

This program simulates the procedure of multiplying two large numbers with paper and pencil. Each step of the process is a one digit by one digit multiplication. The units digit of the result is written down, and the tens digit is carried over to be added to the next column. For example, when multiplying 53 times 7, 3 times 7 gives 21. The 1 is written and the 2 is carried. Then 7 times 5 gives 35, in which 5 plus the carried 2 is written. The 3 is carried and finally written, giving a result of 371.

THE FUNCTION OF FUNCTIONS

Let's talk about the concept of user-defined functions. A statement such as DEF FNC(X)=INT(X/10) in line 340 defines a function called FNC. All function names begin with FN and are followed by a valid floating-point variable name, such as C, U, or M3. The variable in parentheses is a "dummy variable." When the function is used later in the program, X is given a value, and that value is substituted into the right side of the equation wherever X appears. It really doesn't matter which letter is used in the left-hand parentheses for the definition of the function, as long as the same letter is used in the appropriate places on the right side of the definition.

As an example, if we had a line such as A=FNC(52), the computer would replace X in the function definition above with 52 and calculate INT(52/10), giving A the value 5. If instead we had program lines such as T=24 : PRINT FNC(T), the computer would substitute the value of T (which is 24) for X in the function definition. Then the value of INT(24/10) or 2 would be printed.

Why would you use these user-defined functions? Their main advantages are clarity and, in some cases, a savings of memory. Their main disadvantage is speed. For long function formulas that may be used more than once in a program, it is a convenience and possibly a space-saver to be able to type the formula once, and then call it by name from then on. The execution of these functions, however, takes the computer longer than if the actual formula is written out each time. In this program, the main advantage is clarity.

Function FNU(X) (read "FNU of X" or "function U of X") finds the units digit of any number X. FNC(X) finds the "carry" or tens digit of X. FNM3(X) is a little more interesting. It is called a MOD 3 function. Its value in standard notation is X MOD 3.

MOD MATH

The MOD 3 (or modulo 3) function in essence gives the integer remainder when the integer X is

divided by 3. For example, 0 MOD 3 is 0, 1 MOD 3 is 1, 2 MOD 3 is 2, and 3 MOD 3 is 0 again. Can you determine 25 MOD 3? The remainder when 25 is divided by 3 is 1, so 25 MOD 3 equals 1. How quickly can you determine 12345 MOD 3? If you are familiar with the concept of "casting out 3's" you can quickly see that 12345 MOD 3 is 0. Adding the digits of 12345 and dividing by 3 works as well as dividing the entire number 12345 by 3. (Unfortunately that method works only for MOD 3 and MOD 9.)

The Commodore allows only a single dummy variable in a function definition. That is not a disadvantage since the right side of the definition may contain other variables which are not dummy variables. When the function is used, whatever value these other variables have will be used in evaluating the function.

For example, if we wanted a general-purpose MOD function, we could define it this way:

```
10 DEF FNM(X) = ABS(X) - N * INT(
ABS(X)/N)
```

To find 5 MOD 3, we would type:

```
20 N=3 : PRINT FNM(5)
```

The computer replaces X in the function definition with 5, and it also uses the current value of N which is now 3. Any other result such as 12345 MOD 9 could be found similarly:

```
30 N=9 : PRINT FNM(12345)
```

Consequently constants, variables, and a dummy variable may appear on the right side of a function definition. Only the dummy variable need be specified when the function is used. The current value of any other variable is automatically used by the computer. One final consideration is that the replacement for the dummy variable may itself be a variable. In that case, the computer simply uses the current value of that variable. For example:

```
40 N=5 : PRINT FNM(N)
```

will replace both N and X on the right side of line 10 with a 5. By the way, what is N MOD N for any value of N?

We are using the MOD 3 function in our *Lengthy Multiplication* program to determine where the commas between digits in the answer should be. In line 630, N keeps track of how many digits to the right of the decimal point we are currently printing. There should be commas after printing digits. . ., 13, 10, 7, and 4 since we are printing from left to right. Thus we print a comma after every digit that is 1 (MOD 3) from the decimal point, except 1.

THE BIG TIMES

Run *Lengthy Multiplication* a few times. The numbers you specify to be multiplied must not extend beyond the end of the second screen line from where they start. You may follow the first number with the <RETURN> key. That way both numbers may be close to 80 digits long. Otherwise, be sure to separate the numbers with a comma.

Let's see how our Commodore performs when it comes to multiplying numbers with 69-digit products. The values listed in lines 920 through 940 of *Lengthy Multiplication* represent the three factors of the value listed in line 950. Z$ represents the number 2 raised to the 251st power, minus one. The task of the Cray-1 was to start with Z$ and figure out the values of W$, X$, and Y$—certainly a much harder task than we are capable of.

At least we can now check the Cray's results. Change line 40 to GOSUB 920. Line 1000 will set A$ equal to W$, and B$ will equal X$. The result which is printed out should equal WX$, which is shown in line 960. Now remove line 1000 and run the program again. This time A$ is set equal to WX$ and B$ equals Y$ in line 1010. The product which is printed is actually W$ * X$ * Y$, which should be the same as Z$ except for the commas. If it is, then your computer has just verified that the Cray-1 did indeed find the three factors of Z$. And to think that the Commodore can do all that in less than five minutes!

NOW FOR DIVISION

If we really want to use our computers for efficiently finding factors of numbers, we must be able to divide. The program *Lengthy Division* on page 81 allows us to divide any two integers of any length up to about 80 digits each. Once again, this program is modeled after the procedure for long division with paper and pencil. For that reason, it is not nearly as efficient as possible. It is, however, fairly straightforward to understand.

The difference between this program and the *Unlimited Quotient* program given earlier is that this

Continued on page 94

DIRECTORY ASSI$TANCE

by Joycelyn Sue Woods

WHY LET YOUR FINGERS DO ALL THAT WALKING? PUT YOUR DISK DIRECTORIES ON HARD COPY.

Keeping track of programs in my library started to become a problem about three months after I had purchased my disk drive. By six months, finding a program was a miracle. Printing the diskette directory with direct commands was not sufficient, since I wanted more information than file size, name, and type. In addition, the directory listing was printed in the left margin, making it impossible to punch holes for binder rings. After months of looking for a program that would print the directory in a nice neat listing and not finding one, I decided to write my own.

The result is the following disk utility program (DUP). All you will need to run it is an expanded (+8K) VIC 20 or Commodore 64, disk drive, and printer. It needs no documentation. Just load, run and follow the prompts. Operation messages are printed on the screen during execution of the program. For each directory entry, the name, blocks, bytes, load address, and type are printed. The disk name and id, total number of entries, and the allocated and available blocks are printed on the first page. A maximum of 144 entries, or 3 pages, can be printed. Page one lists up to 36 directory entries, page two 37 to 90 entries, and page three 91 to 144 entries. When the printing is complete you will be prompted for another directory listing and then signaled with a beeping tone if you fail to respond to the prompt.

Following is a line-by-line explanation of the program with a tutorial on the directory format.

Set-up Routine: Lines 1-20

This routine sets the screen colors and prints the message "Wait. . .Setting Up" as it executes the subroutine at line 2000, which sets the initial variable values and array parameters.

Directory Routine: Lines 100-250

The error channel is opened and closed for errors, after which the directory is opened as a file on line 110. Lines 120-130 input 6 variables and throw them away on the first pass (K=0). On subsequent passes (K=>1) lines 140-160 calculate the size of the entry in blocks. Line 165 inputs another byte and checks the status. Line 170 inputs bytes until CHR$(34), a quote, is encountered. This indicates that the first character in the program name is next. The entry name is input one byte at a time and added to the variable N$. When another CHR$(34) is encountered, control is transferred to line 180 where N$ is placed into the array P$(K). In line 185 dummy spaces CHR$(32) are input until a character is encountered. In lines 190-200 the entry type is input one byte at a time and added to the string C$. C$ is then placed in the array TY$(K) and formatted for output. On the first pass (K=0), line 205 transfers control to lines 225-250 (lines 225-260 for the VIC) which prints the directory information on the screen. P$(0) holds the diskette name, and TY$(0) holds the id number of the disk. Line 250 increments K and

transfers control to line 125 which inputs the size of the first directory entry. On subsequent passes (K= 1), line 205 will be ignored. In line 210, the entry number (K) is printed on the screen and the number of blocks in the entry is added to the variable BU, which holds the total number of allocated blocks. The status is checked and control transferred to line 125 for the next entry.

Read Load Address Routine: Lines 300-380

In lines 305 to 320 the directory file is closed. The drive is initialized and checked for errors. The variables US$, FR$, and PK$ are formatted for screen output. In lines 325-370 a loop is set up to input the load address of each directory entry. Lines 340-365 calculate the load address, place it in LA$(K) and format it for output. The drive is initialized on line 375, and the message "End of Directory" is printed on the screen. Line 385 closes the error channel on the drive.

Print Directory Routine: Lines 400-490

In line 405, I is set to 1 for loop control and placed into I$ for output. LP=6 sets the number of entries printed before a guide line is printed across the page. Kount keeps track of the number of lines (66) printed per page. In lines 410-415, the message "Printer Open" is printed on the screen, and the printer (device 4) and monitor (device 3) files are opened for output. The monitor must be opened like any other device when the CMD command is used. In line 420, the message "Printing Directory" is printed on the screen. In lines 425-445, the heading of the first page, which includes the disk information, is printed. Then lines 450-455 print each entry in the directory. When the directory listing is complete line 460 prints a line across the page, linefeeds to the end of the page, and transfers control to line 490. Line 465 prints a line across the page after every six entries. The number of entries printed per page is controlled in lines 470-480. When K is equal to 36 or 90, control is transferred to the printer subroutines at 2065 or 2040 which linefeed to the top of the next page. Then the page number and disk name are printed and underscored. Line 485 increments the I counter and formats it for printing (I$). Control is then transferred back to line 450 which prints the next directory entry. The printer and monitor files are closed in line 490.

Another/Beep Routine: Lines 500-540

Line 505 prompts for another disk directory. In lines 510-515 the sound registers are cleared and values

POKEd into the SID chip. Lines 520-525 check the keyboard for input (Z$) and if none is found, signals completion with a beeping tone. When a key is pressed, control is transferred to lines 530-535, which either end the program or clear all the variables and transfer control back to the start of the program. If the wrong key is pressed, line 540 clears Z$ and sends control back to lines 520-525.

Variable Subroutine: Lines 2000-2025

All the variables and arrays are set in this routine.

P$(K)=entry name	BY$(K)=number bytes
BK$(K)=number blocks	LA$(K)=load address
TY$(K)=file type	*K=145

Printer Subroutine: Lines 2030-2065

In subroutine 2035, a line (CHR$(192)) is printed across the page. Line 2040 sends linefeed to the printer and positions the paper for the next page when the maximum number of entries have been printed for pages 2 and 3. Lines 2045-2060 send linefeeds to the printer when the maximum number of entries have not been printed for any page. Line 2065 sends linefeeds to printer at the end of page 1 and positions the paper at the top of page 2.

Disk Subroutine: Lines 2070-2085

Lines 2075-2080 read the error channel and, if an error occurs, terminate the program. Line 2085 initializes the disk drive during operations.

Printer Comments: Lines 2090-2095

This program is written to print less than 85 entries. This is because a directory with more than 85 entries will need a full 66 lines, which is maximum on page 2. When a directory has 85 entries or more you will have to adjust the heading on page 2 so that it is printed on the top line. To make this adjustment you will have to remove three carriage returns (R$) from line 2065. Position the paper exactly at the top of page 1.

The VIC 20 version is the same as the Commodore 64 with the exception of printing on the screen and the beep routine. The lines which are different are listed after the Commodore 64 program.

If you would prefer not to type in the program you may send $3.00 with a disk/cassette and a SASE mailer to:

Joycelyn Sue Woods
436 East 69 Street
New York, NY 10021

SEE PROGRAM LISTINGS ON PAGE 75

DISK DIRECTORY TUTORIAL

A 1541 formatted diskette is divided into 35 tracks which are further subdivided into 683 sectors (see Table 2). The number of sectors in a track can vary. This arrangement facilitates quicker retrieval of data and as far as I know is a feature unique to Commodore. The first two bytes of a sector contain the pointers to the next block. In the middle of the diskette Track 18 is reserved for the disk directory. Sector 0 of Track 18 contains the Block Availability Map (BAM) and the directory header. The remainder of Track 18 holds a record of each directory file beginning in Sector 1. Each sector in the directory is further divided into eight 32 byte chunks (8 × 32 = 256 bytes = 1 block) containing the file name, type, size, and location. The structure of a single file is shown in Table 1.

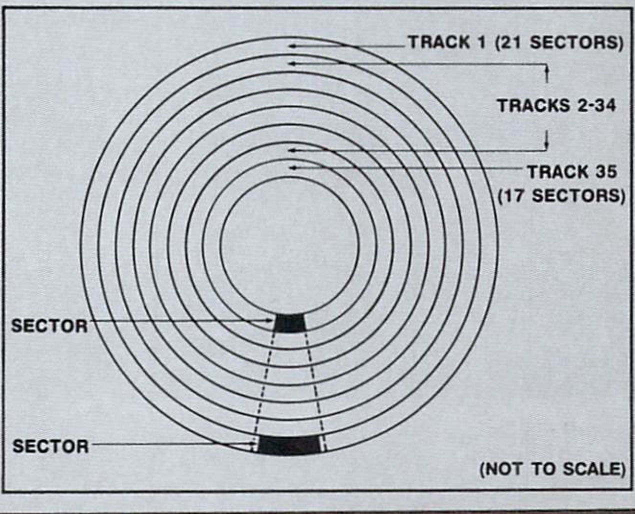
TABLE 1
Track 18, Sector 1

Byte	Directory Block Structure Information	Byte	Single File Structure Information
0-1	Pointers to next block	0	File type
2-31	1st Entry	1-2	Location (track, sector)
34-63	2nd Entry	3-18	Name
66-95	3rd Entry	19-20	Relative file only
98-127	4th Entry	21	Relative file only
130-159	5th Entry	22-25	Unused
162-191	6th Entry	26-27	Replaced file location
194-223	7th Entry	28-29	Size (blocks)
226-255	8th Entry	30-31	Unused (space)

TABLE 2
Diskette Format

Track	Sector Range	Total Sectors
1-17	0-20	21 × 17 = 357
18-24	0-18	19 × 7 = 133
25-30	0-17	18 × 8 = 108
31-35	0-16	17 × 5 = 85
		683 blocks

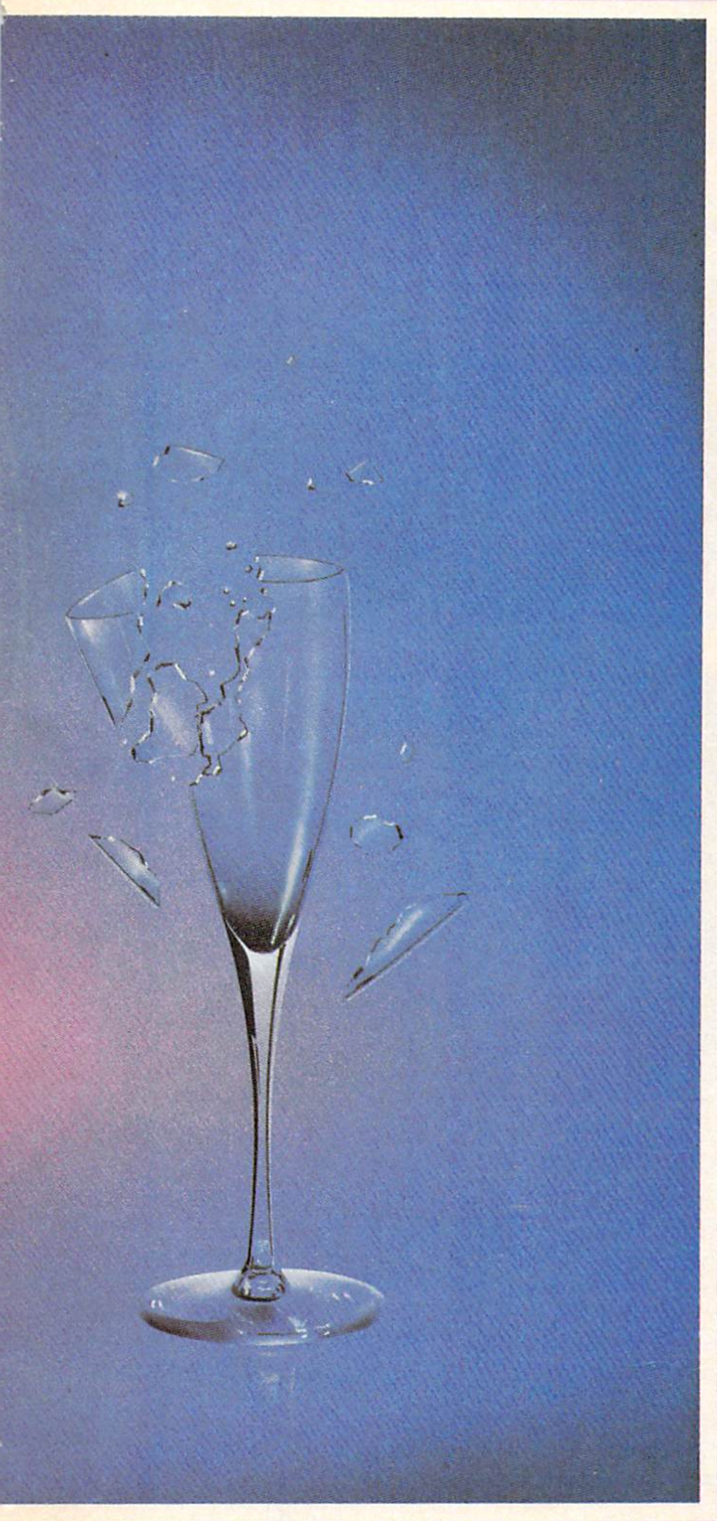
(683 − 17 ($) = 664 blocks)



Unraveling the Myster



ies of Sound on the C-64



by David Barron

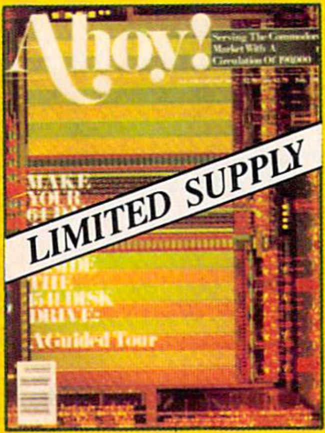
Many have attempted to exploit the sound capabilities of the Commodore 64. This seems like a straightforward task, but obstacles are soon met. One becomes enraged and confused by the many parameters available for control. These parameters are in actuality very simple to understand once a basic knowledge of electronic music synthesis is acquired.

THE HEART OF THE SYSTEM—OSCILLATORS

The very heart of the electronic music system is known as the oscillator. This device produces the basic tone that is colored and shaped by other devices into music. Inside the SID chip in the 64 are three oscillators. This results in three sound channels or voices, together capable of producing three notes at one time. Oscillators may produce many different types of "waveforms." A waveform is a picture of what the sound waves would look like if we were able to view them. One of the most rudimentary waveforms is the square wave (see figure 1). It is named after its square shape, and produces one of the most harsh sounds. Other waveforms include the triangle wave (figure 2) and the pulse wave (figure 3). The use of one of these waveforms rather than another is determined by the sound texture you desire. The 64 is capable of producing three rudimentary waveforms. These are the sawtooth, triangle, and pulse waves. Each one has its own unique coloring, but coloring doesn't stop here. Read on and learn about filters!

FILTERS—THE GREAT AUDIO BLOCKADE

Filters provide the most versatile means of varying the coloring of a tone. They change a sound by removing part of it. When you listen to a stereo and turn the treble control down, the sound becomes muted and less bright. In effect, you have filtered out the "high end" of the sound. The same can be done to a tone produced by an oscillator by what is called a low pass filter. This will let all the low tones through, but will remove the high portion of the sound. By using a variable low pass filter we may select the pitch at which the highs start to be removed. In figure 4 is a typical chart of a low pass filter's effect on a signal (this particular filter has a



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Ahoy!

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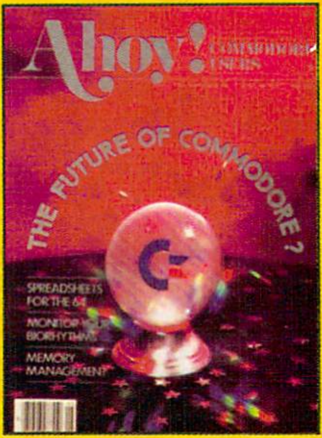
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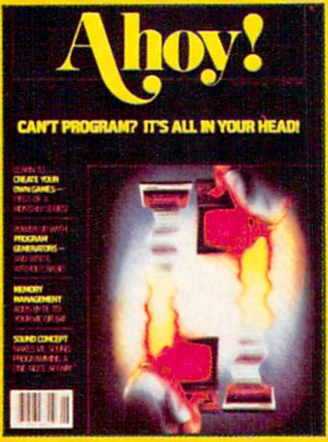
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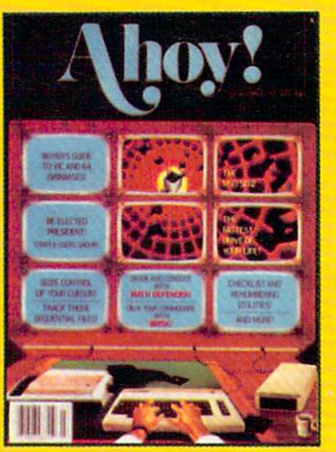
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cutoff frequency of 1000 cycles per second). By passing a raspy square wave through a low pass filter we can change it to a mellow sign wave (figure 5). Aside from low pass filters, there are also high and bandpass filters. High pass filters (figure 6) allow highs to pass while cutting lows (similar to turning down the bass control on your stereo). Band pass filters only allow a certain frequency range to pass. If you passed a song featuring a singer, bass, and flute through a bandpass filter tuned to the range of the singer, the other instruments would drop out (filtered out—figure 7). The Commodore 64 allows you to make use of high and low pass filters to vary the sound from a bass to a piccolo.

ENVELOPES—NOT JUST FOR LETTERS ANYMORE

The last major characteristic involved in shaping a sound is called the envelopes. This describes the volume characteristics of a note. Ever strike a note on a piano and hold it? Then do the same thing with the pedal depressed? The sound is different, but the tonal characteristics are the same. The sound produced with the pedal is more drawn out, or *sustained.* This characteristic, as well as *attack, decay,* and *release,* all control the envelope of a note. Figure 8 contains a time versus volume chart illustrating the function of the four control values:

Attack—This is the time it takes for a note to reach maximum value once sounded.

Decay—This is the time it takes for the volume to drop from its maximum to the sustain level.

Sustain—As long as the note is held, it remains at this level.

Release—This controls the time it takes for the volume to fade out once the note is released.

Individual registers for each oscillator (remember those?) store the information for the envelope. These may be modified as desired to produce any type of sound. A very percussive instrument such as a drum might follow an envelope as in figure 9, while a flute might follow the envelope in figure 10.

By experimenting with the parameters described you can create an infinite number of sounds ranging from a cacophony of drums to a Steinway.

Next month I will present a BASIC program to allow experimentation with sound characteristics on a Commodore 64. Stay tuned!□

FIG 1

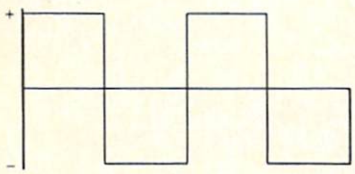


FIG 2

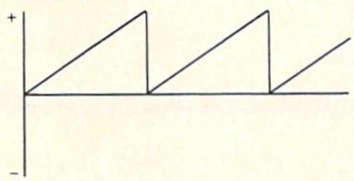


FIG 3

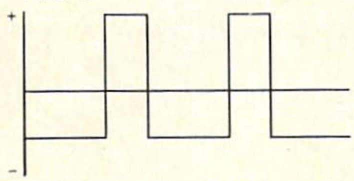


FIG 4

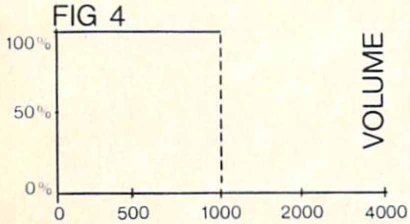


FIG 5

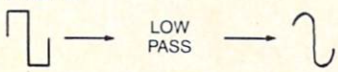


FIG 6

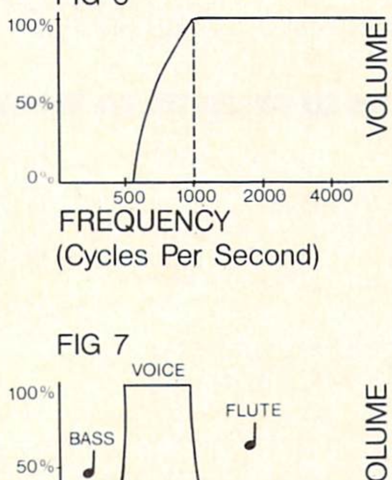


FIG 7

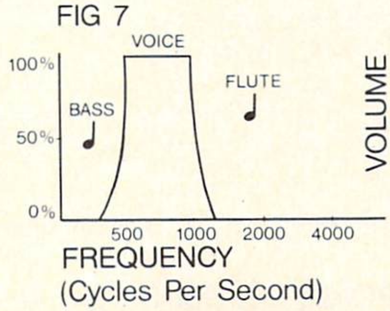


FIG 8

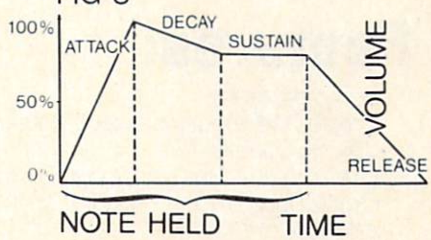


FIG 9

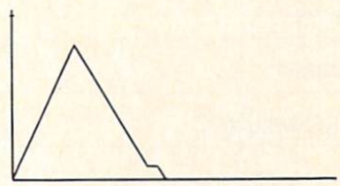
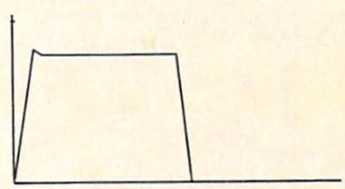


FIG 10



Reader Service No. 72

THE TERRIBLE TWINS

Sibling Rivalry for the C-64 and VIC 20

By George Trepal

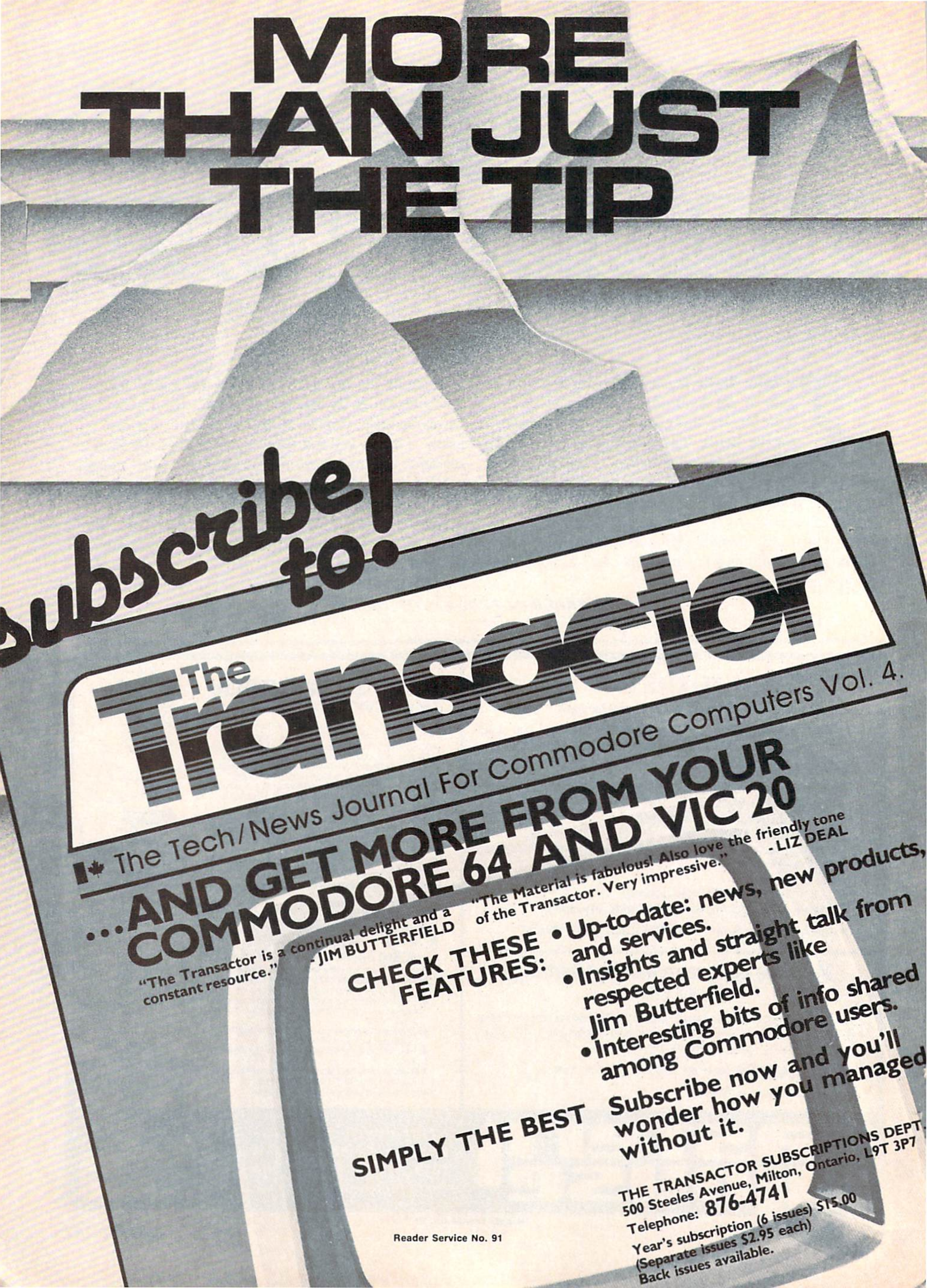
Terrible Twins is a children's game that is sure to get a lot of adults hooked too. The idea of the game is to drop honey on the twins. The honey is in bags held over the Twins by breakable strings. Patterns on the screen constantly change. If you press the space bar when the patterns match, a string breaks. If you press the bar when the patterns are different, a broken string is mended. Of course, there are different skill levels and the patterns can change at different rates.

Versions for the VIC and C-64 are given. The VIC version is for the unexpanded VIC. If you have extra memory, remove it before you run the program. The 64 version takes advantage of the larger memory and has more explanation and (ah!) music.

No novel or exciting programming techniques have been used. The whole game is made using the keyboard graphics characters. These characters are made into strings and printed onscreen when the program calls for them.

Have a honey of a time!

SEE PROGRAM LISTINGS ON PAGE 82



Reader Service No. 91

REVIEWS

PAINT MAGIC
Datamost
Commodore 64
Disk

Ever since early man first began sketching animals on the inside of his cave, people have used art to communicate their experiences, ideas, and emotions. Even today when we have tens of thousands of words at our disposal, telecommunications networks linking all parts of the globe, and photographic equipment capable of exactly duplicating any image, we still have a need to express ourselves through art. Whether it's a cartoon character doodled on a note pad while talking on the phone, or a majestic landscape of oils on canvas, there is something rewarding, even therapeutic, about re-creating 3D images in two dimensions.

Datamost's *Paint Magic* lets you do just that by turning your C-64 into a palette, your monitor into an electronic canvas, and your favorite joystick into a push-button paint brush that never needs cleaning. The images you create can be simple line drawings or complex studies of color and perspective using all *Paint Magic's* advanced features.

The heart of the program is the Color Pattern Selection Menu. When this is called up by pressing f3 on the keyboard, you can begin by selecting your three drawing colors as well as your background and border colors. All sixteen colors are available, but you must choose five to work with during the initial drawing. Once the basic picture is completed, you can "mask" in all the additional color you desire by overpainting portions of the original artwork with new colors.

Lines, squares, and circles can all be created to your exact specifications by using the keyboard in conjunction with your joystick. Simply press L, B (for Box), or C, move the cursor in the desired direction, and *voila*, instant geometry. Individual pixel-sized points can be drawn by selecting the "." (period), and plotting the points with the fire button.



Paint Magic: *roll over van Gogh.*
READER SERVICE NO. 53



Where races are won: the **Pitstop.**
READER SERVICE NO. 54

All closed shapes, whether plotted by the computer or drawn freehand, can be "filled" in one of five ways. Choosing from your working colors, you can fill an area with pure color, horizontal stripes, vertical stripes, diagonal checks, or by selecting one of four predrawn patterns. The program even allows you to use patterns that you design yourself.

Other features include "Transpose" which allows you to pick up a section of your picture and shrink or enlarge it to any size, "Image" which exactly duplicates the section, and "Grab" which lets you draw with a section you've picked up. There is even a "Magnify Mode" so you can easily add fine details, pixel by pixel.

Mistakes can be fixed by painting over the section with the background color, or by pressing "R" (Restore). This second method gets rid of the last function you chose. For example, if you tried to fill a shape and, because of a small opening in its border, the color spilled out onto other parts of the canvas, "R" would erase all of the fill color. If all else fails, you can wipe the canvas clean and start fresh by pressing SHIFT CLR.

Your completed pictures can be permanently saved to disk simply by pressing SHIFT S and choosing a title for your masterpiece. Although the electronic paintings you create with *Paint Magic* may never line the walls of the Louvre, it's still rewarding to have friends and relatives crowd around your video monitor for a mini-exhibit of your best work.

If you have any doubts about the power and flexibility of this program, just get your local software dealer to show you the excellent assortment of paintings that come on the program disk. While you may not be able to create images of this quality, *Paint Magic's* simple commands, help menus, and well-written instruction booklet will help you make the most of your artistic ability.

Datamost, 8943 Fullbright Avenue, Chatsworth, CA 91311-2750 (818-709-1202).

—Lloyd Davies

PITSTOP
Epyx/Automated Simulations
C-64
Cartridge; joystick

Monaco, LeMans, or St. Jovite, the action is fast and furious. Network cameras mounted in cars give us the picture of bone-numbing vibration as speeds approach 200 mph. In incredible traffic, the

leaders manage to turn in lap times that are almost unreal.

But where is the real drama? Where are hundredths of seconds, passing like eons, lost or saved? In the pits. Commentators often credit racing wins to the most efficient pit crews. The pit, part of the thrill of real racing, has always been missing from computer driving games. Until now.

Epyx's *Pitstop* is an excellent race car driving game for one or two players. That does not put *Pitstop* into a class by itself. What does is the pit action. You drive your racer around a single track or a circuit of up to six tracks. Beginners had better start with the rookie level, easiest of three.

Your joystick-controlled car is extremely responsive. Lateral movement this quick in a real vehicle would probably send you sliding through the infield. Running off the road or colliding with other cars causes only a minor loss of speed. In *Pitstop* you spend your time driving, not accelerating to catch the pack. Sloppy driving will, however, wear out your tires much faster.

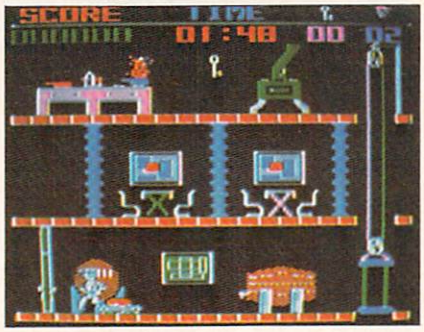
The bottom of the screen shows speed, fuel, and lap time. To the left is a radar map that shows your position on the track. Indicated by a dot on the map, the exit lane to the pit will appear as a fork to the right. When your fuel is out or your tires are worn (turned red), you'd better not miss the pit exit.

In the pit, you have a crew of four men whom you move one at a time with the joystick: two tire changers, a gas attendant, and a flagman to let you back on the track. Your pitstop's not hard to complete, it's just hard to complete *fast*. You can feel your winning position slip away as the pit clock clicks.

The driving portion of *Pitstop* is similar to *Pole Position*, but the pit action makes this a real race. Now if they'd just add Jackie Stewart's voice...

Epyx/Automated Simulations, 1043 Kiel Court, Sunnyvale, CA 94089.

—Richard Herring



Help our hero pull off The Heist.
READER SERVICE NO. 55

THE HEIST
Micro Fun
Commodore 64
Disk

Under most circumstances, robbing a museum of all its *objets d'art* would be considered reprehensible behavior and certainly not the kind of activity to be simulated in a computer game. This is, however, precisely the objective in *The Heist,* the newest Micro Lab creation by Mike *"Miner 2049er"* Livesay. Before you condemn this harmless exercise in computer espionage for promoting anti-social behavior, let me quickly assure you that the theft of countless works of art by the game's hero, Graham Crackers, is all for a good cause. Only by removing every piece of artwork from the museum can Graham find a hidden micro dot that contains top-secret info, vital to the safety of the world.

The museum consists of 90 rooms on three levels. Each level is made up of ten screens and each screen is a cross-section of the museum showing three rooms at once. By exiting at the left or right of any screen, Graham Crackers reappears on the next screen. In this way, the game is like *Pitfall* in an art museum, although the transition from one screen to the next isn't as smooth.

The artwork which is liberally scattered throughout the museum can be collected in any order. All you have to do is touch a piece and it's yours. Your mission is made difficult, however, by deadly robot guards that patrol the museum. Contact with roving monitors, stationary drones, or floating sweepers will cost you a game life. Fortunately, these electronic watchdogs are all fairly short and easily leapfrogged.

In addition, some of the floors have narrow openings which can be jumped over or fallen through to reach the floor below. If Graham Crackers accidentally falls through an opening and there is no solid floor below to land on, you can kiss another game life goodbye. A safer way to travel between floors is via the escalators and elevators that are found in various rooms.

Other obstacles include locked doors, lethal electric doors that periodically open and close, and solid walls. To open a locked door, you must pick up one of several keys that are found on each level. Keys can be collected and used as needed. A display at the top of the screen lets you know at a glance how many keys Graham has in his possession at any given time.

If the museum's defense systems don't do in our hero, the time limit may. If you go longer than two minutes without finding an art object or key, another Graham Cracker bites the dust. Successful completion of a level, therefore, requires a good balance between

speed and caution.

With each new level, the number of locked doors, robot guards, and other dangers increases—but then so does the excitement. Simple graphics, solid game play, and a continuous musical soundtrack add up to an enjoyable addition to your game library. With *The Heist,* crime might not pay, but it's sure a lot of fun.

Micro Fun, Inc., 2699 Skokie Valley Road, Highland Park, IL 60035 (312-433-7550).

—Lloyd Davies

MATH SAT I
Micro Learn
Commodore 64
Disk

Math SAT I is designed to help high school students who already have a background in math, algebra, geometry, and quantitative problems to prepare for the Scholastic Aptitude Test. The two-sided disk contains a pretest and a post-test, as well as sections on math skills and geometry and two sections each on varied topics and algebra. Each section has from 11 to 30 problems with answers presented in a multiple choice format.

The pretest, post-test, and varied topics sections repeat questions from the other sections. But do not assume that you can cover the whole program quickly. Every time a question is presented, the answers are reordered so the learner has to read them closely, not just remember which position the correct answer was in last time. Also, for many of the questions (one third to one half), drills are available. A drill consists of three to ten problems which require similar skills to solve. After the program presents a problem which requires a new skill, it may ask if you want a drill. If so, it may first show you a screen of math formulas or rules.

There are a few problems with questions like this one from the pretest:

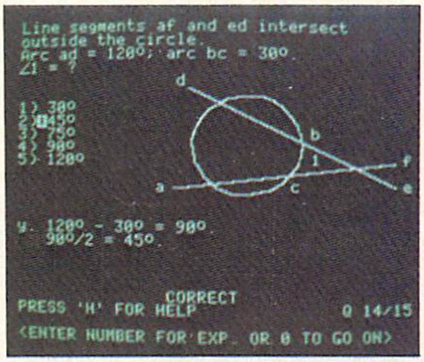
$$2a + 2b = 9$$
$$5c + 5d = 20$$

A. 2 B. Average of a, b, c, d

1) A. A>B
2) B. B>A
3) C. A=B
4) D. cannot tell

Your guess is as good as mine about the meaning of A., B., C., and D. in the answers.

If you run any section of the program as a test, you go straight through the questions. Since they are loaded one at a time from the disk, after you answer one, about 15 seconds are necessary before the next question is displayed. For 45 seconds or more after that the disk will keep spinning and prevent you from entering an answer. I presume that the program is loading the explanations for



Prep for the SAT from all angles.
READER SERVICE NO. 56

wrong answers even though it is in test mode and will not display them. Most students will require more than that 45 seconds to solve a problem, so the wait is not bad.

When you finish a test, the program will give your score, then review each question you missed. This time through, questions are presented as tutorials. For each answer you give, the program will offer an explanation. Once you have completed the questions you missed in the test, the program will ask if you would like to repeat the ones you got correct. Both of these reviews were valuable, but on several occasions, the program crashed before the review could begin. Either the disk continued to spin (at least past the limits of my patience—10 to 15 minutes), or the computer would return the error message "string too long error in 40000."

Each of the eight sections of the program can be used as a tutorial. For any answer you pick, a detailed explanation of why it is right or wrong will be displayed. Explanations of wrong answers often give you a hint or the first step to finding the correct answer. Even if you give the right answer first, the program lets you see the explanation of any other answer so you can gain maximum understanding. As you select each answer, it is marked with an asterisk.

All questions are presented as white letters on a gray background, making them easy to read. Only simple graphics, including line segments, triangles, and some of the roundest circles I have seen on a computer are used. Letters are placed inside angles as labels. Sometimes, if two angles are very close, it is difficult to tell which angle the letter is paired with. Modified characters are used as exponents so notation is accurate. Some of the exponents, however, are bizarre at best. The five looks like something I once shot in *Space Invaders.*

Answers are usually numbered

from one to five. After you have answered a question correctly, you can press zero to continue with the next question. Most keystrokes are screened out by the program. You cannot, for instance, answer "A" to a question. But you can give any number from six to nine as an answer. This will not hurt your score, but these numbers should be trapped by the program.

As you progress through any section, the number of the question you are on and the total number of questions in the section are always shown. If you do a drill in the middle of a section, the program also tells you which drill question you are on. From within a drill, you can continue to the next drill question or jump out of the drill at any time. If you quit without completing a section, the program will automatically calculate your score. The number of correct first responses are given as a percent of the number of questions, including drills, that were displayed on the screen.

Worthy as the goals of *Math SAT I* are, I have reservations. Typing errors (like the choice between "A>B" and "B<A") and program bugs need to be exterminated from this software. Scoring could be more like the SAT's method instead of a straight percent. I like the features designed into the program and do not even mind the slow disk access since it prevents students from discovering answers by reading the program listing.

In general, programs like *Math SAT I* are precisely the applications which make computers valuable. SAT study guides tend to be forbidding, if not because they are so dry, then because they are heavy enough to dislocate your shoulder. Compared to studying such tomes, running through a few questions in a computer program does not seem like such a huge task, but the study hours can really mount up.

Micro Learn, Micro Lab, Inc., 2699 Skokie Valley Road, Highland Park, IL 60035 (phone: 312-433-7550).

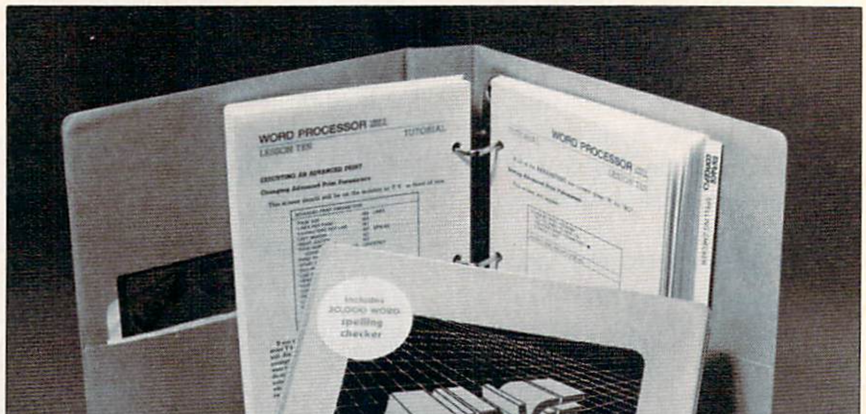
—Richard Herring

WORD PROCESSOR, PROFESSIONAL VERSION
Mirage Concepts, Inc.
C-64
Disk

Mirage's *Word Processor, Professional Version* ($89.95) is a full-featured program that will be useful in any environment except a full-blown business setting. It comes with a spelling checker, the capability of printing form letters, an 80-column onscreen display mode, and the flexibility to use any popular printer; you need buy nothing else. I will mention the few small quirks along with the discussion of features, but let me get my only real problem with the program out of the way first.

Once *Word Processor* is loaded, you have 16K of memory remaining for your text—that translates to about 4½ single-spaced pages or 2400 words. If most of the documents you write are shorter than this, you are home free. But if you create windy treatises, you will see the "Memory Full" prompt all too often. Your solution is to save what you have written and continue under a new file name. At print time, just chain the files together. Nothing onerous—unless you want to edit the whole document. Then you will have to check the spelling of each file separately. Global search and replace will not jump from file to file either.

And you had better pay atten-



The manual for Mirage's word processor is itself noteworthy.
READER SERVICE NO. 52

tion to that "Memory Full" prompt. If you back up and edit that almost-too-long document, you may find the screen frozen and keyboard commands useless. If you exceed 16K by merging a disk file with text in memory, you may get the chance to recover, or you may end up back in BASIC with the program (and any text you have not saved) nowhere to be found.

With that off my chest, let me tell you the good stuff. Mirage has one of the best manuals I have seen—including a tutorial (each chapter with its own goals and summary), alphabetical reference of program commands, and quick-reference card—no surprise features. The warranty policy is fair, too. After 90 days, it costs $10 to replace the program; a backup costs $7. An updated program which corrects a bug is free.

When you load *Word Processor,* the first option you have is to select any combination of screen colors. Unless you are using your Watchman for a monitor, you will find a color combination that is easy on your eyes. As you enter text, the program automatically wraps whole words to the next line if they are too long.

You see seventeen lines of text on screen; the top eight lines tell you where you are and what you are doing. I wish you had the option to turn that menu off and see more of your own text onscreen, but.... Counters tell you the cursor's position; not screen position, but position on the page when it is printed. The right margin can be set as high as 255. If you scroll backward through text, the counters reset to zero; you will have to hit a function key to reset them.

The screen acts like a typewriter. (Not quite—the pixels never clog with ink.) Toggle on the sound, and you get a click every time you hit a key. One line in the middle is highlighted. The cursor is always on this line; text scrolls "behind" it.

Want to move around? How about single commands to move left or right a character, a word, or a line at a time? Or, to the beginning or end of a line, sentence, paragraph, block, or document? There are matching commands that allow you to delete in the same ways. With seventeen delete commands, you may have trouble filling up 16K.

As you enter or insert text, it is automatically reformatted onscreen —usually. If you get an odd screen display, use a command to reformat the paragraph or the whole document. While editing, you can choose to overtype old text or to insert your editing. With a single command, you can insert 40, 80, or 160 blank spaces (useful if you prefer overtype mode).

Set and clear all the tabs you like. Tabs are only effective, however, within a printed line. You cannot tab to the next line, but once you get there, your tabs will work. Marking a block of text only requires hitting a function key at the beginning and end of the block. Then you can copy, move, or delete the block, print it, or save it on disk. You can also deal with columns as blocks, but they can only be moved horizontally.

A search and replace feature is available so you can find any word or group of words up to thirty-five characters long. *Word Processor* can automatically replace every occurrence, or it can show you each one and give you the choice of making the change or not.

It's always easy to get a disk directory or format a disk—both essential features. After editing a file you have already saved, you will have to come up with a new name; *Word Processor* will not overwrite your old file or automatically turn it into a backup.

Before you print a document, you'd like some idea of how it will look. Hit a function key and you toggle into 80-column mode. You can enter and edit text in this mode, but you won't want to because it is slow and kludgy. It is, however, the ideal way to check your text. After refocusing a bit (your eyes, not the TV) you can even read these skinny characters.

The standard print option requires that your text be in memory. Changes in the number of characters per line and in line spacing can be imbedded in the text. Up to twenty-six other printer commands can also be imbedded, but you will have to build (and save on disk) a special command file to match your printer. I don't understand why no command files are included with *Word Processor* since the manual tells you what you need for Epson, Gemini, NEC, and Okidata printers.

At print time you specify left and right margins, lines per page, and characters per line. You can also choose to have text justified and to pause between pages. If you need even more printing features, you can use the advanced print mode. Your text will be printed from a disk file, not from memory, but you will be able to add headers, footers, and page numbers. When you use page numbering, you can set the number of the first page and print any one page or a selected group of pages.

Advanced print also allows you to set line spacing, print multiple copies (up to 255), chain files, and print form letters. For form letters, up to nine fields (which

may include names, addresses, etc.) are pulled from a list you create, and placed wherever you indicated when you typed the letter. Your document is reformatted to fit the length of the inserted words. An option is available to have printing pause so you can enter each field from the keyboard.

Last, the spelling checker; a separate program with a list of 30,000 words. This program will take five to eight minutes to check your text, then show you each word it doesn't know in context (eight lines of onscreen text). You can fix the spelling, add the word to the dictionary (up to 2000 user-entered words), and look for similar words in the program's word list if you are not sure of the spelling.

When your text is corrected, you can save it as a new file or overwrite the old file. If you add many characters while making corrections, you may lose the last few characters of your text. The spelling checker requires that the dictionary be on its own disk. So you'll be forced to manipulate three disks—program, dictionary, and data.

Mirage Concepts, Inc., 4055 W. Shaw #108, Fresno, CA 93711 (phone: in CA 800-641-1442; rest of USA 800-641-1441).

—Richard Herring

ULTRABASIC 64

Abacus Software
C-64
Disk, cassette

The Commodore 64 has very sophisticated sound and graphics capabilities. Unfortunately, they are a bit too sophisticated for the novice to access through BASIC. Even for the advanced programmer, Commodore's BASIC lacks the commands necessary to easily take advantage of these features. Fortunately, an antidote has been developed by Abacus Software. This miracle drug is called *Ultrabasic 64.*

Ultrabasic 64 adds 50 commands to the BASIC language of the Commodore 64. These commands deal with high resolution graphics, sprite graphics, turtle graphics, sound, and game controllers.

The hires command set allows you to display figures on the hires screen. There are two graphics modes: hires and multicolor. The multicolor graphics mode gives you half of the normal high resolution, but you can use more colors on the graphics screen. Graphics commands allow you to plot points, lines, rectangles, and circles. There are also fill commands, tic mark commands, and provisions for displaying text on the hires screen. A graphic function, PIXEL, allows you to determine the color of a specific point on the hires screen. Other commands allow you to save and load graphics screens from tape or disk, and to switch between graphics and text screens.

Sprites are readily supported by *Ultrabasic.* Sprites may be defined in three ways. The simplest and most convenient of these is by using the BIT command. This command allows you to enter the bit pattern of the sprite as ones and zeroes in a series of BASIC lines. The image formed by the ones and zeroes is the image that the sprite will appear as. The other two methods involve entering the image data as a series of decimal or hexadecimal numbers. Commands allow you to turn sprites on and off, position them on the screen, expand them horizontally and/or vertically, and rotate them 90 degrees in any direction. Two commands are provided to check for collisions between sprites or other graphics.

Ultrabasic includes turtle graphics. In turtle graphics mode, a small turtle is displayed on the graphics screen. It can be positioned anywhere on the screen and pointed in any direction, then moved forward with the "pen" up or down. When the pen is down, the turtle will leave a trail wherever it goes in a specified color. The command BYE will make the turtle disappear from the screen, but will still allow you to use turtle graphics commands. There is also a function which returns the turtle's current screen position and the angle of the turtle.

Ultrabasic includes three commands for reading from the control ports. These commands allow you to determine the position of joysticks, game paddles, or light

pen.

Ten user-programmable timers are built into *Ultrabasic*. Five of these timers count down in jiffies, and five of them count down in seconds. Two commands allow you to either set or read the values of the timers.

All sound control features of the 64 are supported by *Ultrabasic*. Commands allow you to set up a sound generator, play a sound for a particular duration, and control volume and filters. You can also define "tune patterns" with a special type of data statement where letters and numbers tell *Ultrabasic* what type of sound to produce. *Ultrabasic's* sound is interrupt-driven, which means that sound can be playing while the computer continues to execute other instructions.

Additional commands in *Ultrabasic* allow you to repeat a certain series of commands until a certain condition is met. This is similar to the REPEAT. . .UNTIL structure found in PASCAL. Hardcopy of the graphics screen can be produced on a Commodore, MX-80, FX-80, Gemini, or Okidata printer. The hardcopy printout can be produced in one of two sizes. The larger size prints vertically down the paper roll.

Ultrabasic even adds some of its own error messages to BASIC.

In conclusion, *Ultrabasic* gives you what Commodore should have included in the 64's BASIC language. The commands added to the Commodore 64 by *Ultrabasic* should make programming with graphics and sound easy for almost everyone.

Ultrabasic is available on tape ($39.95) or disk ($42.95) from Abacus Software, P.O. Box 7211, Grand Rapids, MI 49510 (phone: 616-241-5510).

—Michael Kleinert and David Barron

CIE IEEE-488 INTERFACE

Micro Systems Development
Commodore 64
Cartridge

Last month we reported on the MSD SD-2 dual disk drive. At that time, we had indicated that the SD-2 was equipped with an IEEE-488 interface port as well as the VIC/C-64 serial bus. The CIE cartridge from MSD ($109.95), when inserted into the

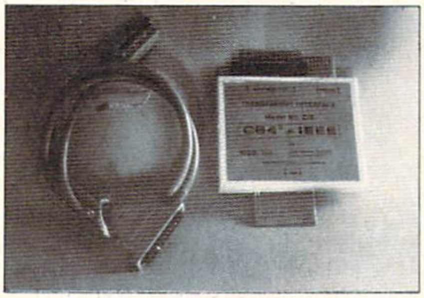


Photo 1: the MSD CIE IEE-488
READER SERVICE NO. 57

Commodore 64 expansion port, will provide an IEEE-488 port for the computer. When used in conjunction with the SD-2 disk drive, the LOAD and SAVE speed for disk operations will more than double. In addition, all of the PET peripherals as well as many IEEE-488-compatible instruments can be interfaced to the computer.

For the newcomers in our audience, the IEEE-488 interface was adopted by Commodore for use with the PET and CBM series of computers. It was actually developed in the mid-70's as a general purpose interface for the interconnection of programmable instrumentation. It is based on work originally done by the Hewlett-Packard company, who referred to it as the Hewlett-Packard Interface Bus (HPIB). As more users adopted the standard, the name was changed to the General Purpose Interface Bus (GPIB). The present official title is provided by the Institute of Electrical and Electronic Engineers in an 84-page document entitled The IEEE Standard Digital Interface for Programmable Instrumentation.

The cartridge is a rather bulky affair (photo 1) which is inserted into the expansion port. When installed, it extends the back of the computer about 5.75 inches. When the IEEE cable is connected, the required back clearance is on the order of 10 inches. The 3/8-inch diameter, 24-conductor cable is rather stiff. Careful consideration should be given to the physical layout. The slip-on printed circuit board edge card connectors are held in place only by friction. It is therefore important that all movement of the computer be avoided when the CIE is in operation. A slipup during a disk write could have serious consequences.

The electronics is fairly straightforward (photo 2). The operating system is stored in a 2-kilobyte ROM chip, labeled CIE in the photo. The bulk of the work is done by a 6526 Complex Interface Adaptor. Two of these chips are also part of the Commodore 64. The vertical connector at the back of the board is for use with additional plug-in cartridges.

The IEEE cable ($50.00) must be purchased separately. The computer end of the cable is a 24-pin, printed circuit edge card connector. The peripheral end is a 24-pin, double-sided "D" type connector. Two screws are provided at the peripheral end to insure a secure connection. The double-sided connector allows the daisy chaining of additional IEEE-488 devices. The maximum number of devices is limited to five by the interface electronics.

After power up, the CIE is initialized by executing a SYS 57278

command. This results in the transfer of one kilobyte of code to the top of BASIC RAM at 39936 ($9C00). The I/O locations at 56832 ($DE00) and 57088 ($DF00) are used as well. The documentation includes two brief programs which will relocate the code to either 52224 ($CC00) or 31744 ($7C00). A third program allows the use of serial bus devices by assigning up to two de-

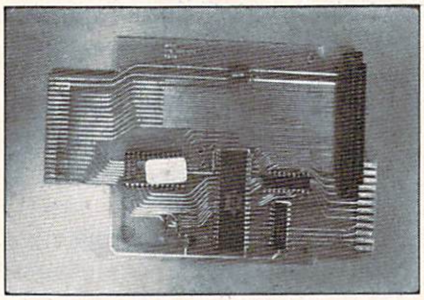


Photo 2: the electronics are stored in a 2K ROM chip (labeled CIE).

vice numbers to the IEEE-488 port.

A disk-based program, the CIE Revision 2 Patch, is available on request. In addition to performing the above functions, the Rev 2 Patch allows the IEEE interface software to be relocated to the RAM which is normally hidden under the Kernal ROM. Actually, the entire Kernal is transferred to RAM and then modified. One effect of this transfer is the loss of all cassette operations. The original Kernal can be restored by a POKE 1,55. Memory location one is actually a control port on the 6510 microprocessor. It is used, in the Commodore 64, to control which layer of memory the computer will use.

The biggest bugaboo with all interfaces that do not totally emulate a VIC peripheral is compatibility with commercial software. The primary reason is the necessity of the interface device to use some of the Commodore 64's built-in RAM or the displacement of RAM with external ROM. Although the 64 has plenty of memory, most of the more elaborate commercial programs manage to use nearly every byte of it. This is particularly true of recreational software with large amounts of high resolution graphics. These programs will frequently use the Kernal RAM for their own purposes as the standard routines are not needed once the program is running. The most common result of trying to run these programs is an abort in mid-load as the CIE routines are written over. In general, there should be no difficulty with programs written in BASIC.

A number of commercial packages do support the CIE interface, for example, *KMMM Pascal*. However, we do recommend that you check your favorite piece of software for compatibility before you buy.

Owners of the PET CBM peripherals who wish to use these devices with a Commodore 64 would do well to consider the CIE interface. Program developers would find the doubling of disk operating speed to be most useful. Serious hobbyists who write a lot of their own software will find the extra speed an added convenience. Game afficionados and users of commercial software are likely to be disappointed when it comes to compatibility. The hardware was well-constructed, though somewhat lacking in finish. A pair of user-installed support legs at the back of the cartridge could be improved. We would have liked to have seen gold plating on the edge connectors for maximum reliability. The installation functioned well, without any problems, although we did have to rearrange some equipment to make space for the cable.

Micro Systems Development, Inc., 10031 Monroe Drive, Suite 206, Dallas, TX 75229 (phone: 800-527-5285).

—Morton Kevelson

EDUMATE LIGHT PEN
Futurehouse
C-64, VIC 20

Depending on your expectations, the Edumate light pen is either a great buy or a real disappointment. The package includes a light pen with a spring-coiled cord and a disk with four programs. (The disk for the C-64 does not work on the VIC 20.) The four programs demonstrate light pen applications. They include a drawing program, a menu-driven disk utility, a 3D tic tac toe game, and a music program which features a note table.

The light pen works well, although it is not precise. It is very sensitive. The display screen responds to the pen as much as six to eight inches away from the screen. The software requires that you press a key to turn the device on, so you do have control.

The cord is much heavier than the pen, which makes it a little uncomfortable to use. Children especially may find the pen tiring to operate. A lighter cord would also prevent an annoying tendency for the pen to refuse to stay put when you lay it down.

The sample programs are not suitable for general use. Children and inexperienced adult computer users will find the documentation inadequate. Each program is explained in fewer than 200 words.

The programs are not very intriguing. The disk utility program illustrates the light pen's easy use in choosing menu options, but none of the options are important enough to load the program. The 3D game is frustrating because the authors chose to display only

one level at a time. Only a patient and proficient musician is likely to make anything but noise from the music program.

The drawing routine is fun. The pen draws easily, and you can change the color of the lines by hitting a color key on the C-64. Erasing is harder. Neither the drawing nor music routines permit saving whatever you create. Nor is there a screen dump for printing a drawing.

A computer user who buys software and peripherals for use without modification will probably be disappointed by the Edumate package. He will wear out the novelty and learning available in the bundled software very soon. He is unlikely to be tempted to buy the other light pen-compatible software published by futurehouse.

On the other hand, a programmer who has been itching to play with this fascinating peripheral may count this package a great buy. The documentation includes the essential information necessary to program with the light pen. The four sample programs are all in BASIC, and can be LISTed. The drawing program uses machine language subroutines which are loaded from BASIC. The programmer can study the routines and elaborate on them.

The very simplicity which makes these programs uninteresting to a non-programmer insures that even intermediate programmers can use them for a base for further experimentation. At this low price, the computer hobbyist can try out an input device which promises to be useful in future computer applications.

The Edumate light pen retails for $34.95. For $59.95, Futurehouse offers a package of light pen plus the *Peripheral Vision* graphics program, which ordinarily retails for $39.95.

Futurehouse, P.O. Box 3470, Chapel Hill, NC 27514.

—Annette Hinshaw

COMMANDER ULTRA TERMINAL-64

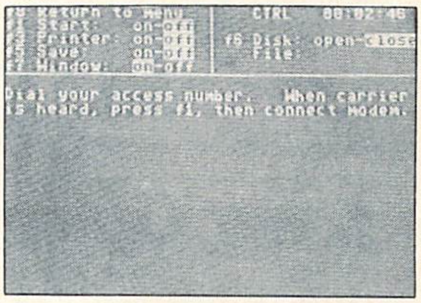
Creative Equipment
Commodore 64
Cartridge

Commander Ultra Terminal-64 ($69.95) is a cartridge-based telecommunication program designed to work with a VIC Modem. It allows you to call a remote computer—either an information service like the Source, Compuserve, Dow Jones, or Delphi, or another microcomputer with a modem and a communications program. Information you send and receive can be displayed on your TV screen, sent to your printer, and saved to or loaded from your disk drive.

Once you plug it into the cartridge slot and turn on your C-64, you will page through six screens which allow you to set a wide variety of options. After the title page, you will see a menu that allows you to change screen colors. Not only can you adjust the program to different color or black and white sets, but you can also choose different colors for characters you send and the characters you type—a nice touch. Changing colors is also possible when you are on-line with another computer, but there is no way to save your preferred color choices; you will have to reset them every time you use the program.

Moving among the six different screens, from title page to communications mode, can be a bit confusing. Among the first three pages of options, you move back and forth by pressing N for the next page or L for the previous (last) page. To get from the third option screen to the fourth, you will have to press f1. Press M to go into communications mode and f8 to return to the option screens. You'll use the program several times before this all becomes comfortable.

One option screen lets you configure the program for just about any printer or disk drive combination. You pick the type of printer you want to use (if any) and its device number, as



Includes numerous option screens.
READER SERVICE NO. 58

well as the device number of your disk drive if you want to upload (send) or download (receive) files and programs. *Commander Ultra Terminal-64* does not support cassettes and does not allow disks to be formatted.

From another option screen, you can print out a file you have already saved to disk. At first I did not understand why this feature was included. Then I hit a long disk file that had some valuable information at the end. The program allows you to read through the file at various speeds. When you find the section you want to print, toggle the printer on. This super feature means you will not have to load your word processor to print parts of your modem file. All files must be saved under the name "uterm-64xx" where "xx" represents a pair of numbers you input.

The last option screen sets up your modem. You can select

baud rates from eleven to 120 characters per second. (Most modems only support 30 characters per second.) Choose full duplex to communicate with information services or half duplex when you call another C-64 owner. You can also set the number of stop bits, parity, and the number of bits per word. If you don't know what to do, relax—the program defaults to the settings you will use most often. If you are communicating with another C-64 running *Ultra Terminal-64,* you can send Commodore's non-standard CBM ASCII characters.

As soon as you make a connection with another computer, a clock will begin to run: the time shows on the screen so you can keep track of how awful your long-distance bill will be. If you need to, you can change most options while you are communicating. While you are logged on to another computer system, you may need to send a control character (Control-S pauses communications, control-Q restarts them, etc.). The control key is used in a strange way. Press <CTRL> once and let go; the next key press will send your control character. You cannot hold the control key down.

Commander Ultra Terminal-64 works fine with either of the Commodore modems. I had hoped to try it with an acoustic couple modem and a Hayes Smart Modem, but I could not get it to work with an RS-232 interface. When I called Creative Equipment, they said it should work. Having no suggestions, they asked me to call back and tell them how I made the RS-232 connection if I was successful. The program comes with three pages of instructions which describe all options, but not in any logical order.

Creative Equipment, 6846 West Flagler Street, Miami, FL 33144 (phone: 305-261-7866).

—Richard Herring

ROOTIN' TOOTIN'
HesWare
Commodore 64
Cartridge; joystick

Adapted from a Japanese arcade game, *Rootin' Tootin'* is a musical maze-chase that pits a trapped tuba against a bizarre assortment of musical adversaries. As you guide your tuba around the scale of four-line staffs, you must clear the maze completely of eighth-notes, while avoiding six pursuing musical instruments. Instead of Inky, Pinky, and Blinky, your tuba is chased by the likes of Guitaco, Guitaro, Madphone, Trien, Cymbomb, and Pianha. Each enemy has its own *modus operandi,* and all are deadly.

Guitaco, for example, is slow, but follows your every move. If you take too long to clear the maze it will mutate and become a fast-moving Guitaro. Madphone is not only fast, it often reverses direction and can shoot lethal sound waves. Trien moves much faster than your tuba. The good news is that he doesn't try to follow you. The bad news is that it drops stars that kill your tuba on contact. Cymbomb travels slowly and doesn't even try to follow your tuba. Unfortunately, just when you think you've got the maze cleared of eighth-notes, you realize that Cymbomb has repopulated the scale with fresh notes that must be eliminated. Finally, Pianha is the most dangerous of all the instruments because it doesn't necessarily have to stay on the staffs.

Don't despair, however; your tuba has a few tricks of its own. As eighth-notes are blasted off the screen, they wipe out all enemies in their path. These include stars and sound waves as well. Also, eighth-note rests periodically appear and can be picked up to temporarily turn your enemies into stationary G clefs. The clefs can then be gathered up for big points —200 for the first, 400 for the second, 800 for the third, and so on. You will also encounter an occasional bonus tuba which you will be able to pick up for a bonus life.

Rootin' Tootin' is a one- or two-player game that makes excellent use of the C-64's graphic and sound capabilities. The colorful contest is played to continuous music that can be silenced with a touch of the – (minus) key. Despite the "cuteness" of the game's theme and characters, *Rootin' Tootin'* is a difficult maze game to master. To get beyond the fourth or fifth level (there are at least twenty-one) requires you to develop sound strategies and foolproof patterns. If you find great maze games addicting, *Rootin' Tootin'* is certain to have you hooked in no time.

HesWare, 150 North Hill Drive, Brisbane, CA 94005 (phone: 415-468-4111).

—Lloyd Davies

C232 RS-232 INTERFACE
Micro Systems Development, Inc.
C-64; also available for VIC 20

The C232 is an interface that plugs into the C-64 user port. It converts that user port into a standard RS-232 (or serial) port, which accepts regular DB-25 connectors. What all that really means is that now you can hook up third party modems and serial printers to your C-64. This interface is about half the size of a VIC Modem. (Actually, it is a little too high and will lift the left rear corner of your computer a little. Since the user port is just

the edge of the C-64's main circuit board, that is a little spooky.)

MSD's interface makes your C-64 look like Data Terminal Equipment (DTE). Nine essential pins are supported—1 is ground, 2 is transmitted data, 3 is received data, 4 is request to send, 5 is clear to send, 6 is data set ready, 7 is signal ground, 8 is carrier detect, and 20 is data terminal ready.

For most modem connections, you will just need a cable that connects these nine pins of the interface straight across to nine corresponding pins of the modem. Since most modems are Data Communications Equipment (DCE), you will not have to make any fancy connections.

If you are connecting a printer through this serial interface (most serial printers are DTE's) you will have to have a more complicated cable. Often, crossing lines 2 and 3, 4 and 5, and 6 and 20 will get you up and running. A serial cable with those three sets of pins crossed is usually called a null cable.

The C232 interface comes with few instructions—about four pages worth. If you are a novice at serial interfacing, these instructions (like my last two paragraphs) won't make much sense. If, however, RS-232 does mean something to you, a bunch of good information is provided.

The instructions describe the BASIC commands necessary to use the C232. (It behaves like a cassette recorder, but is set up as device 2 instead of device 1.) Two bytes are sent to configure the interface. You can choose stop bits (1 to 2), word length (5 to 8 bits), and baud rate (50 to 2400) with one byte. The second byte sets parity (none, odd, even, mark, or space), duplex (full or half), and handshake.

Program examples include a BASIC modem driver and a wedge which prevents the computer from sending data faster than the printer can accept it. This is enough information for an intermediate programmer to write a communications program or at least modify one from a magazine.

Although the instructions lack a tutorial in RS-232 interfacing (a good one would be worth the cost of the modem), MSD provides super support. When I called with a question, they gave me a toll-free number and the name of a person to contact. The best part was that this guy was actually a technician; he understood my question and made some suggestions (at least one of which was embarrassingly simple). If you have ever called a computer company, you know that this is real red carpet support.

Price is $49.95 (same for V-64 VIC 20 version).

Micro Systems Development, Inc., 11105 Shady Trail, Suite 104, Dallas, TX 75229 (phone: 214-357-7051).

—Richard Herring

SYNTHY-64
Abacus Software
C-64
Disk

Over the past couple of years, the number of music programs available for the Commodore 64 has grown tremendously. Today, there is more music software available for the C-64 than almost any other home computer. This is partly because of the comupter's Sound Interface Device (SID) chip. This small hunk of silicon lets you generate all types of sound from photon torpedo explosions to Bach three-part inventions played on electronic harpsichord.

Synthy-64 is a program designed to take some of the complexity

out of music programming by letting you write music much as you would a BASIC program. Each line of music is given a line number from 2 to 62999. Individual notes are specified by letter (A-G), octave (1-8), and duration. Anything from a whole note to a sixty-fourth is possible including triplets, dots, and the rare double-dots. The basic pitch of a note can also be modified with sharps, flats, and naturals.

Although *Synthy-64* allows you to control many aspects of the music including tonal quality, volume, tempo, and key signature, each parameter has its own default value. For example, if a tempo is not specified, it will automatically be set at 100 beats per minute. Likewise, volume is always at maximum unless you choose a different setting. Because of these default values, you can enter music quickly without having to waste time adjusting every little detail.

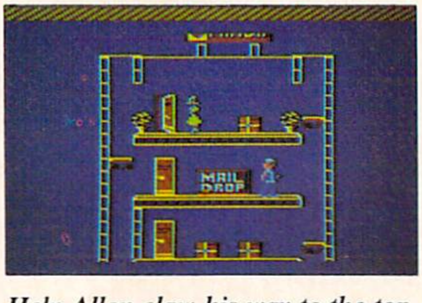
Without a doubt, *Synthy-64* gives the music programmer more options than any other music program available. Not only can you reproduce virtually any rhythmic or tonal structure found in conventional music, you can also control the envelope and sound characteristics of all three voices. Adjustable parameters include waveform (you choose from triangle, square, or sawtooth); attack, decay, release speed, and sustain level; and filter frequency, resonance, and bandwidth. In addition, just about every aspect of the music can be altered automatically in mid-composition.

It should be understood, however, that *Synthy-64* is more of a music programming language than it is a music program. What you give up for all of the added flexibility is some of the user-friendliness. There are no staffs here, complete with G clefs and beautifully drawn eighth notes. No colorful, hi-res synthesizer knobs or sliders to manipulate with your joystick. There's only you, your instruction book, and the computer. Therefore, although any imaginable type of music can be produced with *Synthy-64*, it could take a lot of hard work to program a lengthy composition.

There are flashier programs available, but none that offer more control over the music. If you feel as comfortable behind the computer console as you do at the piano, then *Synthy-64* is a great way to pump some music out of your C-64.

Abacus Software, P.O. Box 7211, Grand Rapids, MI 49510 (616-241-5510).

—Lloyd Davies



Help Allen claw his way to the top.
READER SERVICE NO. 59

COHEN'S TOWERS
Datamost
Commodore 64
Disk

Allen should have given up two years ago when he asked his uncle, The Boss, for a summer job and was turned down. He should have got the hint last year when, again, his uncle refused to hire him. Instead he persisted and after two years he has finally been rewarded with a job as mailboy. In this "important position," it will be Allen's responsibility to collect all the mail in the Fanda building and deliver it to the mail drop. It won't be easy but, with your help, he can do it.

The packages are scattered throughout the high-rise office building and must be carried to the mail drops one at a time. To reach each of the building's several stories, you'll have to jump your joystick-controlled mailboy onto and off of Fanda's perpetually moving elevators. If Allen travels on an elevator for too long (about two floors in either direction), he will be crowned by a falling flower pot and die. For dying without first giving written notice to The Boss, Allen receives one demerit. Four demerits and, not only is Allen out of a job—the game ends.

Once Allen arrives on a floor to retrieve a package, he is often greeted by Fear, The Boss's dog. Fear doesn't bark, but his bite is deadly. Avoid the miserable mutt at all costs by hopping over him.

If you manage to get all the packages at Fanda safely to their mail drops, The Boss authorizes a 700 point bonus and promotes Allen to Datamost where his assignment will remain the same. This time, however, the action is speeded up and Fear races around after Allen as if he's on Puppy-Uppers. Survive Datamost and it's on to Cohen's Towers to face the ultimate challenge.

Although most gamers will have a difficult time clearing the Fanda building the first few times through, persistent players will soon discover the tricks and timing necessary to reach advanced levels. Colorful scrolling screens and clever visual effects combine to make *Cohen's Towers* an arcade-quality piece of software.

Datamost, 8943 Fullbright Avenue, Chatsworth, CA 91311-2750 (818-709-1202).

—Lloyd Davies

COMMODARES

Programming Challenges

By Dale Rupert

Each month, we'll present several programs designed to toggle the bits in your cerebral random access memory. We invite you to send your solutions to:

Commodares, c/o *Ahoy!*
P.O. Box 723
Bethel, CT 06801

We'll print and discuss the cleverest, simplest, shortest, or most unusual solutions. Be sure to identify the name and number of the problems you are solving. Also show sample runs if possible, where appropriate.

Your original programming problems would be equally welcome!

PROBLEM #8-1: INSIGNIFICANT INCREMENT

In this program, when X=8.5E9, the value of A that is printed actually changes. But when line 10 is changed to X=8.6E9, the value of A never seems to change.

```
10 X = 8.5E9
20 FOR A=X TO 1E38
30 PRINT A
40 NEXT
```

What is the largest value of X for which A actually changes? In other words, how small must X be so that an increment of 1 in the FOR-NEXT loop is actually significant?

Be sure to tell how you solved this one, and how you explain what's happening here. For one more twist, explain why A doesn't actually appear to be incremented by 1 each time as you run the program with X=8.5E9. A apparently goes up by twos for a while.

PROBLEM #8-2: BUG ELIMINATOR

Use lines 10 through 30 below to put a bug "*" at a random position on the screen followed by its trail. Write the rest of this program which will now find the bug and change it to a dead bug "0".

```
5 REM PROB. #8-2:BUG ELIMINATOR
10 PRINT CHR$(147)
20 FOR L=1 TO RND(0)*1000
30 PRINT ".*" CHR$(157);:NEXT
```

Note that CHR$(147) clears the screen, and CHR$(157) moves the cursor left.

PROBLEM #8-3: LETTER FREQUENCY

The user types in a sentence. The computer displays a count of the number of times each letter of the alphabet occurs in the sentence.

For example, if the user types "TEST SENTENCE", the computer prints out:

```
C=1    E=4    N=2    S=2    T=3
```

The list should be in alphabetical order and contain only letters which occur in the sentence.

PROBLEM #8-4: USEFUL FUNCTIONS

No restrictions on this one. Create the most useful, unusual, or outstanding user-defined function using DEF FN that you can.

Tell what it does, and give examples of how it works. What could be easier?

Last month's *Problem #7-1: Definite Ending* was submitted by Paul Dawson (Springhouse, PA). Paul sent the following one-line solution along with it (spaces added for clarity):

```
10 FOR A=1 TO 1E38:FOR B=1 TO 1E3
8:FOR C=1 TO 1E38:FOR D=1 TO 1E38
:PRINT A;B;C;D:NEXT:NEXT:NEXT:NEX
T
```

He claims that this program will run for 2E+134 years! He also suggests that you press RUN/STOP rather than wait for it to finish.

This solution starts out all right, but after it ran for several hundred trillion millenia or so, I noticed that the display no longer was really changing. In fact, somewhere between the values of D=8.5E9 and D=8.6E9, (I must have dozed off briefly and missed the exact value), D no longer changed its value.

Consequently we must find some other solution to the *Definite Ending* problem. Remember that the display must continuously be changing and the program must eventually stop on its own. I will add that a display which merely scrolls with the same information continuously is not considered a viable solution. Thanks again to Paul for the problem.

Problem #7-2: Unscrambled Word which was submitted by Kent Rittenhouse (Wauseon, OH) turned out to be another good challenge. Printing out permutations of letters is in general pretty tough. There are less than general solutions such as the following which work okay and aren't too difficult to figure out:

```
5 REM SOLUTION FOR PROBLEM #7-2 :
       6 REM    UNSCRAMBLED WORD
10 W$(1)="C":W$(2)="A":W$(3)="T"
20 FOR D1=1 TO 3:FOR D2=1 TO 3:FO
R D3=1 TO 3
30 IF D1=D2 OR D1=D3 OR D2=D3 THE
N 50
40 PRINT W$(D1);W$(D2);W$(D3)
50 NEXT D3:NEXT D2:NEXT D1
```

This program takes all combinations of the digits 1, 2, and 3 in the FOR-NEXT loops. Many combinations are eliminated because of duplicate digits (line 30). Whenever a combination of 3 different digits is found, those letters of W$ are printed (line 40).

To better see what is happening, you might insert line 25:

```
25 PRINT N,D1;D2;D3
```

Once again this is not a very general solution. You should be able to modify it for longer words fairly easily. A different approach (probably using more arrays) would be needed to make it totally general. Thanks, Kent.

A simple solution for *Problem #7-3: Letter Count* is shown below:

```
5 REM SIMPLE SOLN. TO
6 REM PROBLEM #7-3 : LETTER COUNT
10 INPUT"TYPE A SENTENCE";S$
20 FOR N=1 TO LEN(S$)
30 L$=MID$(S$,N,1)
40 IF L$=" " OR L$="." OR L$=","
THEN 60
50 CT=CT+1
60 NEXT
70 PRINT CT "LETTERS"
```

The sentence must not extend beyond the second screen line. The count CT is incremented in line 50 if the character selected in line 30 is not a space, a period, or a comma.

Note that if your sentence contains commas, you must type it within quotation marks. Otherwise the INPUT statement thinks that more than one entry has been made. In that case it responds ?EXTRA IGNORED and uses only the letters up to the first comma.

One solution to *Problem #7-4: Word Count* is listed here:

```
5 REM PROBLEM #7-4 : WORD COUNT
10 INPUT"TYPE A SENTENCE";S$
15 CT=1
20 FOR N=1 TO LEN(S$)
30 L$=MID$(S$,N,1)
40 IF L$<>" " THEN 60
50 CT=CT+1
60 NEXT
70 PRINT CT "WORDS HERE"
80 RUN
```

The problem with this solution is that if more than one space appears between two words, the count will be incorrect.

A way to fix that problem is to keep track of the previous character, and only increment the count on the first occurrence of a space. Adding lines 25 and 45 fixes it:

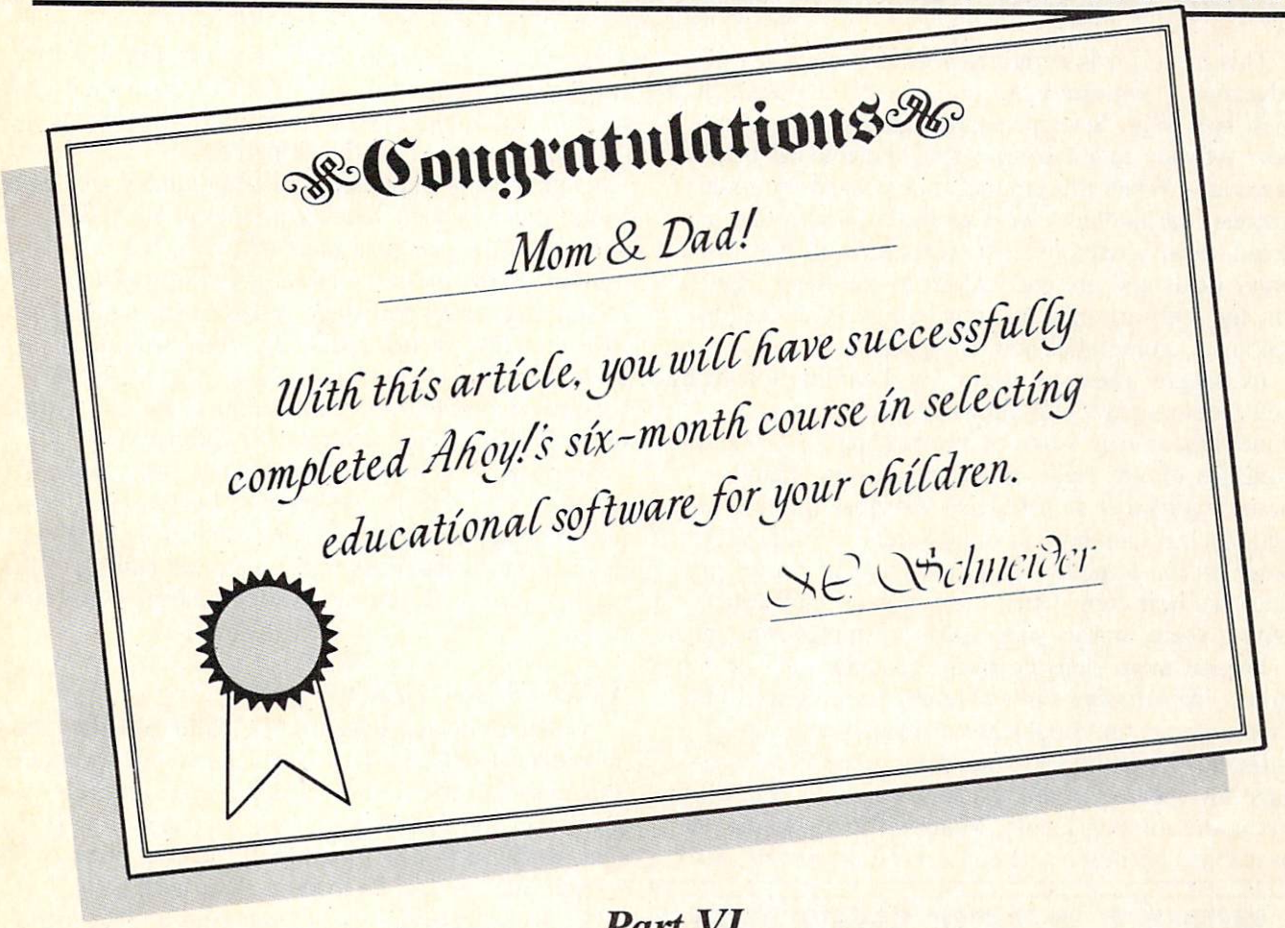
```
25 P$ = L$ : REM SAVE PREVIOUS LE
TTER
45 IF P$ = " " THEN 60 : REM P$=S
PACE?
```

Do you see how this makes the program work properly?

If the rate that responses and ideas are coming in continues to increase as it has been, we will soon have an entire page just listing names of people with solutions to *Commodares*. Your enthusiastic questions, answers, and comments are certainly welcome. Unfortunately, I can't answer all letters individually. If a response is expected, please enclose a self-addressed stamped envelope. I'll answer as many questions as I can either directly or in this column. Remember that patience is a virtue. Especially in this

Continued on page 97

EDUCATIONAL SOFTWARE: A GUIDE FOR PARENTS



Part VI

By Richard Herring

Let's play a game. How many of these statements have you heard uttered as though they were self-evident truths?

1. Computers help kids learn because they give immediate right-or-wrong responses.
2. Computers are patient; they don't care how many times your child makes a mistake.
3. Computers are ultimately logical and encourage kids to think through problems one step at a time.
4. Computers are personally satisfying because kids can control them, tell them what to do.
5. Computers make learning fun because they interact with kids rather than just telling them what is right.
6. Computers are consistent; they can always ask the same question in the same way.

Well, how did you score? That's six statements; heard 'em all? Me, too. I agreed at first, thinking, "That's my kids—bright, rich—maybe I'll retire early." But I thought about it and realized: computers are not any of those things to kids. Software—which is what kids use, not computers—may be or it may not. I used to have a teacher who would turn her back and walk away if a student answered a question correctly. If the answer was incorrect, there was no second chance, no prompting—just scorn. Want to guess what qualities that teacher would put into software if she turned programmer?

This series of articles has been about quality in educational software. I hope they will help you pick (and that past teacher of mine write) the best of the best. But underneath all these articles has been the assumption that it makes sense to use home computers to enhance children's education. Let's not make that assumption blindly; let's explore some very real criticism.

READING SKILLS

"Educational software actually reduces the child's reading ability. Designed for ease of use, most educational games avoid forcing the child to read instructions. And because screen size is limited, the text that is presented is always brief and to the point."

This criticism is certainly true of games; but good educational software can overcome this problem in at least two ways. Several months ago, we considered how software might come with supplemental printed materials. When the program has peaked the child's interest, the booklet can offer more background and detail, even a reference list. (Our kids all have library cards and are encouraged to use them, right?) Or, the software may be aimed squarely at reading readiness, comprehension, or speed.

In *Juggles' Rainbow,* from The Learning Company, preschoolers play with animated butterflies and windmills as they work on pre-reading skills like the concepts of left, right, above, and below. Futurehouse's *Alphabet Construction Set* goes the next step and teaches kids how to draw letters. With a large letter on the screen, a child uses a light pen to produce his best copy. Then the program, complete with a voice, makes suggestions to improve the letter.

Several more steps down the reading road are programs like *Missing Links.* Quotes from various children's stories and books are displayed with letters missing. The child must carefully analyze the passage for spelling, grammar, and syntax to help him guess the missing letters. Many difficulty levels are available; the missing letters can be all vowels, all consonants, every other letter or word, the first or last letter of each word, etc. The documentation even suggests some thought-provoking exercises for the child to do away from the computer.

A number of companies are beginning to use computer voices in their reading programs for young children. This can be a great addition, but use some caution. If the program shows a fancy graphics screen and recites the story without ever interacting with the child, it has effectively duplicated TV. These programs should go further, make the child become involved in the completion of the story, and offer the child some control over the outcome.

Computers can be used to enhance basic skills—the three r's. If that's what you're interested in, you may have to review several programs. Having a computer in the house does not change the skills a child needs—reading is still more important than programming.

ATTENTION SPAN

"Using computer software, the child gets used to immediate feedback. This actually reduces his attention span because he never has to wait. After an incorrect answer, he always gets a second try, so he does not have to pay attention in the first place; enough guesses and he'll get it right eventually."

Good educational software can help a child to focus on one problem or one part of a problem, because it does interact, it does respond to what the child is doing. Two years ago, a study on classroom attention span was conducted at Columbia University Teacher's College. Dr. Mary Alice White, the director of the Electronic Learning Lab, found that children work longer on tasks when they use a computer than when they do not.

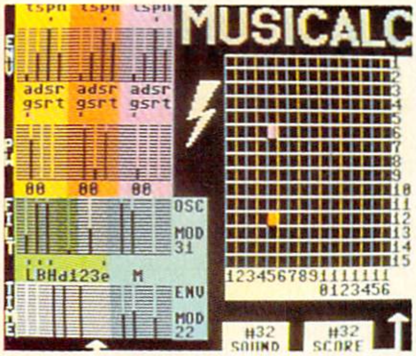
Many programs use a simple and effective approach to the attention span problem; they set a timer and evaluate the child's performance on a series of problems. Edufun takes this approach underwater. In *Frenzy,* an alligator is munching his way through a school of fish. If the child can answer 20 subtraction and division problems before the fish all become lunch, he gets to play the bonus game. The more fish left, the longer he plays. Addition and multiplication skills are improved in *Gulp!!* where a big (hungry) fish chases a small (tasty) fish. Each correct answer speeds the little fish on his way, but every time the child gives an incorrect answer, the big fish swims faster.

Merritt's *MathWiz* is a two-stage program that teaches addition and subtraction of numbers containing fractions. Stage I tutors the child; it gives prob-

lems, prompts for correct answers, and analyzes concept problems the child may have. Once the child reaches a certain percent of correct answers, he goes to stage two—no mercy here. The child had better know his stuff, or he will be bumped back to stage one.

SOCIAL SKILLS

"A child sitting interminably at the computer with dazzling graphic displays, entertaining music, and a responsive (albeit digital) playmate will surely lose social skills. And no matter how computer-crazy our world becomes, we must still be able to relate to one another on a personal basis."



MusiCalc *from Waveform turns your C-64 into a full-featured synthesizer. READER SERVICE NO. 61*

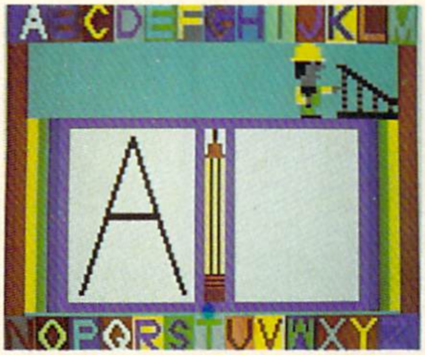
Seymore Papert, a professor of mathematics and education at MIT, asks: "What are the social effects of computers upon young children? Will America be developing a swarm of technical isolates?" He was quoted in the *Boston Sunday Herald,* warning that "Some [children] get so involved with computers that they almost get addicted to them."

Many programs rely on the social skills and peer interaction of children. If the program allows multiple players, one of three conditions will exist. The players will alternate turns, compete against each other, or collaborate with one another. Programs which require children to alternate turns may become boring for players between their turns unless really nice graphics and sound keep their attention.

Alternating turns and playing against each other are strategies which tend to penalize poor players. If the software requires that children pit themselves against each other, make sure it has some handicapping feature to balance the competition between pros and beginners. Some of the best programs allow two or three kids to cooperate in reaching solutions. Although these are my favorites, if you only have one child at home, programs requiring cooperative efforts may not be your best choice.

Whether they require cooperation, as do some fantasy and adventure games, or competition, more common in educational software, programs that involve several children offer something extra. Unicorn's *Race Car 'Rithmetic* pits as-yet-unlicensed drivers against one another. To compensate for different skill levels, each racer chooses the type of arithmetic problem he must answer. Different age kids, and even adults, can sharpen their math skills while heading for the finish line. Score above 90 percent, and you get to drive a high-speed racer in a special game.

Reader's Digest has also released several multiplayer educational games. In *Speedy Spides,* a variety of facts are learned as both players race to the



Alphabet Construction Set *uses oral suggestions to help kids draw letters. READER SERVICE NO. 62*

correct answer. Fact files cover English and math, or you can build your own files. *Cogito* is a fast-paced game of real estate purchase and sale. Both players try to get rich, buy fast, and avoid bankruptcy. Instant bonuses and instant penalties are awarded. You can bet these programs result in some social interaction, although in both, the players must be about the same age for competition to be fair.

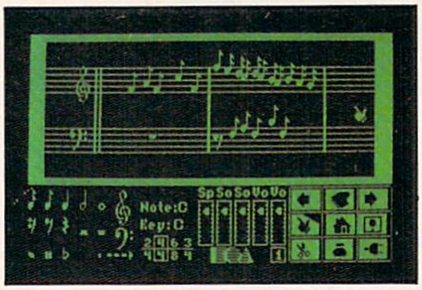
Parents should have distinct goals for their children when they are introduced to computers. You can't expect to sit your child in front of the computer and have an instant baby-sitter; you should get involved in determining how learning happens. Simulation and role-playing games often use a fantasy approach to give the child several lives or to allow him to do something that is impossible. Yet this fantasy is what allows a child to run a business or travel cross-country in a covered wagon. I once heard Tom Snyder, of *Snooper Troops* (and many other educational programs) fame, laughingly suggest that we could build reality into computer simulations by having the program disk erase itself the first time the child failed.

GIRLS AND BOYS

"Boys have always been pushed into the hard sciences and mathematics while we expect girls to do

better in soft sciences and humanities. Computers are just one more way of furthering the distinction between boys and girls. Whom do parents buy computers for? Boys. Who programs computers? Boys. Who makes up the bulk of computer class and computer camp students? Boys."

What long-term social consequences are the probable result? Leona Schaubel, director of educational development for the Children's Computer Workshop, gives several reasons for boys' higher interest in computers. Most software designers have been males, often fathers or teachers, but many times addressing their own need for play in developing educational materials. Themes which address girls are sorely



Music Construction Set *encourages experimentation with musical sounds. READER SERVICE NO. 63*

needed. Just the title of a piece of software, perhaps implying rescue rather than attack, may dramatically influence girls' attraction to it. Further, girls are more likely than boys to play computer games only with a friend, so interactiveness becomes an important factor. And girls usually play within the context of the game. Boys spend more time trying to crash the program or inventing a game within the game. In other words, girls play the game and boys play with the game. These are critical differences that must be addressed if educational software that will involve both boys and girls is to be designed.

In recent studies at Stanford University by Dr. Irene Miura and Dr. Robert Hess, findings pointed to the conclusion that parents are reluctant to invest in their daughters' computer education. Home computers were more often purchased for and used by boys. At computer camps, the studies found, introductory classes were 27 percent girls; advanced classes, only 14 percent. When the camps increased enrollment charges, more girls dropped out.

Much of the answer to involving girls with computers lies with parents. Perhaps as we see more good music and art programs, parents will be willing to invest in computers for their daughters. Once girls get some encouragement, their preferences will begin to drive the system; we will see more software that interests them and more parental enthusiasm.

Music education, always a favorite way for parents to spend money on their daughters, can be enhanced with programs like *Music Construction Set* which encourages experimentation with musical sounds. You can easily change the measure or key of the sample tunes included with the program. Using a pointing finger, you can create standard musical notation. But watch out for the documentation; its motto is "figure it out yourself." Or take a look at *MusiCalc,* which lets you play the 64 like a piano. Acting as a synthesizer, it allows you to create some wild stuff. It will not, however, make you a star, like the booklet claims.

SELF IMAGE

"Computers don't really have anything to offer the child. They are just like commercial TV, only the child has to do some mindless activity to keep the entertainment coming."

When I hear that criticism, I nod my head and keep my mouth shut. Something called self-fulfilling prophecy takes over. If you believe strongly enough that you can not do something, you'll fail. In subtle ways, you set yourself (or your kids) up.

Computers do have something very real to offer a child: success. Kids are interested in those things they can control. Who wants to sit and watch? Or be a robot, doing step-by-step what someone tells you? For children, proficiency with computers (not programming, but operating them) can be a status symbol among both kids and adults. Kids can feel the power of being able to boot up the computer, load a program, and put it through its paces. Even very young children can control this marvelous new device that the adults are fussing over.

But like anything else, if the parent pushes too hard, demands too much, the child's self image may be hurt because he has let his parent down. John Victor, president of PDI, told Antic magazine that in a recent survey PDI conducted of software for preschoolers, most programs were really geared toward eight year olds. Many preschool products were designed more for adults and avoided the repetition which toddlers enjoy. That's one reason it is so important for you to stay involved; make sure your child's experience can be a success.

THE END

Don't delegate. A computer can be a dandy addition to your child's life, but it shouldn't replace qual-

Continued on page 97

PROGRAM LISTINGS

On the following pages are listed several programs that we hope you'll want to punch in your Commodore computer. But please read the following introduction first; there are a few things you'll need to know.

Certain computer commands are displayed on the monitor by a variety of odd-looking characters. To get your computer to display these commands rather than actually perform them, you'll need to enter the quote mode. Hold down the SHIFT key and press the "2" key; a set of quote marks will appear. This tells the computer that the characters that follow are to be displayed, not performed. To exit the quote mode, type another set of quote marks, or hit the RETURN key. You'll also enter the quote mode when you INserT spaces or characters onto a line.

In *Ahoy!'s* program listings, you'll frequently find letters and/or numbers surrounded by brackets { }. That's because, for the purposes of clear reproduction, we at *Ahoy!* use a daisy wheel printer incapable of reproducing command symbols. For example, when you're in the quote mode and press the SHIFT and CLR/HOME keys at the same time, the screen (or a dot-matrix printer) will indicate this command with a heart { }. Because a daisy wheel cannot duplicate this symbol, it substitutes an alternate code between brackets. In the case of the SHIFT/CLR HOME symbol, our printer substitutes {SC}.

Another special case is SHIFT and COMMODORE characters. We represent these by underlining or overlining, respectively: any character underlined in the program listing should be punched in as a SHIFTed character ($\underline{J}$ = SHIFT J), any character overlined should be punched in as a COMMODORE character ($\overline{J}$ = COMMODORE J).

An alternate way of entering commands and other graphics symbols and characters is to use their corresponding character strings. The CLR/HOME command, for example, is entered by typing CHR$(147). While this requires a few extra strokes, it facilitates editing your program or reading the printed listing. For a complete list of CHR$ codes, consult the appendix at the back of your Commodore user manual.

Below is a list of the command abbreviations you'll find in our program listings, the commands they stand for, how to enter them, and how they'll appear on the screen or on a dot matrix printout.

When You See	It Means	You Type	You Will See
{SC}	Screen Clear	SHIFT CLR/HOME	
{HM}	Home	CLR/HOME	
{CU}	Cursor Up	SHIFT ↑ CRSR ↓	
{CD}	Cursor Down	↑ CRSR ↓	
{CL}	Cursor Left	SHIFT ← CRSR →	
{CR}	Cursor Right	← CRSR →	
{SS}	Shifted Space	SHIFT space	
{IN}	Insert	INST	
{RV}	Reverse On	CNTRL 9	
{RO}	Reverse Off	CNTRL 0	
{BK}	Black	CNTRL 1	
{WH}	White	CNTRL 2	
{RD}	Red	CNTRL 3	
{CY}	Cyan	CNTRL 4	
{PU}	Purple	CNTRL 5	
{GN}	Green	CNTRL 6	
{BL}	Blue	CNTRL 7	
{YL}	Yellow	CNTRL 8	
{OR}	Orange	COMMODORE 1	
{BR}	Brown	COMMODORE 2	
{LR}	Light Red	COMMODORE 3	
{G1}	Grey 1	COMMODORE 4	
{G2}	Grey 2	COMMODORE 5	
{LG}	Light Green	COMMODORE 6	
{LB}	Light Blue	COMMODORE 7	
{G3}	Grey 3	COMMODORE 8	
{F1}	Function 1	F 1	
{F2}	Function 2	F 2	
{F3}	Function 3	F 3	
{F4}	Function 4	F 4	
{F5}	Function 5	F 5	
{F6}	Function 6	F 6	
{F7}	Function 7	F 7	
{F8}	Function 8	F 8	

IMPORTANT!
Before typing in the *Bug Repellent* and other *Ahoy!* programs, refer to the information on page 67.

VIC 20 BUG REPELLENT

By Michael Kleinert and David Barron

The program listed below will allow you to quickly debug any *Ahoy!* program you type in on your VIC 20. Follow directions for cassette or disk.

For cassette: type in and save the *Bug Repellent* program, then type RUN 63000[RETURN]SYS 828[RETURN]. If you typed the program properly, it will generate a set of two-letter line codes that will match those listed below the program on this page. (If you didn't type the program properly, of course, no line codes will be generated. You'll have to debug the *Bug Repellent* itself the hard way.)

Once you've got a working *Bug Repellent*, type in the program you wish to check. Save it and type the RUN and SYS commands listed above once again, then compare the line codes generated to those listed in the magazine. If you spot a discrepancy, a typing error exists in that line. Important: you must use exactly the same spacing as the program in the magazine. Due to memory limitations on the VIC, the VIC *Bug Repellent* will register an error if your spacing varies from what's printed.

You may type SYS 828 as many times as you wish, but if you use the cassette for anything, type RUN 63000 to restore the *Repellent*.

When your program has been disinfected you may delete all lines from 63000 on. (Be sure the program you type doesn't include lines above 63000!)

For disk: type in the *Bug Repellent*, save it, and type RUN:NEW[RETURN]. (See above regarding testing the *Bug Repellent* on itself.) Type in the program you wish to check, then SYS 828. This will generate a set of two-letter line codes that you should compare to those listed in the magazine.

To pause the line codes listing, press SHIFT. To permanently pause it, press SHIFT LOCK. To continue, release SHIFT LOCK.

To send the list to the printer type OPEN 4,4:CMD 4:SYS 828[RETURN]. When the cursor comes back, type PRINT#4:CLOSE 4[RETURN].

```
•63000 FOR X = 828 TO 1023 :READ Y
:POKE X,Y:NEXT:END
•63001 DATA 169, 0, 133, 63, 133,
64, 165, 43, 133, 251
•63002 DATA 165, 44, 133, 252, 160
, 0, 132, 254, 32, 228
•63003 DATA 3, 234, 177, 251, 208,
 3, 76, 208, 3, 230
•63004 DATA 251, 208, 2, 230, 252,
 169, 244, 160, 3, 32
•63005 DATA 30, 203, 160, 0, 177,
251, 170, 230, 251, 208
•63006 DATA 2, 230, 252, 177, 251,
 32, 205, 221, 169, 58
•63007 DATA 32, 210, 255, 169, 0,
133, 253, 230, 254, 32
•63008 DATA 228, 3, 234, 165, 253,
 160, 0, 170, 177, 251
•63009 DATA 201, 32, 240, 6, 138,
113, 251, 69, 254, 170
•63010 DATA 138, 133, 253, 177, 25
1, 208, 226, 165, 253, 41
•63011 DATA 240, 74, 74, 74, 74, 2
4, 105, 65, 32, 210
•63012 DATA 255, 165, 253, 41, 15,
 24, 105, 65, 32, 210
•63013 DATA 255, 169, 13, 32, 210,
 255, 173, 141, 2, 41
•63014 DATA 1, 208, 249, 230, 63,
208, 2, 230, 64, 230
•63015 DATA 251, 208, 2, 230, 252,
 76, 74, 3, 169, 236
•63016 DATA 160, 3, 32, 30, 203, 1
66, 63, 165, 64, 32
•63017 DATA 205, 221, 169, 13, 32,
 210, 255, 96, 230, 251
•63018 DATA 208, 2, 230, 252, 96,
0, 76, 73, 78, 69
•63019 DATA 83, 58, 32, 0, 76, 73,
 78, 69, 32, 35
•63020 DATA 32, 0, 0, 0, 0, 0
```

BUG REPELLENT LINE CODES FOR VIC 20 BUG REPELLENT

```
LINE # 63000:MH     LINE # 63011:NN
LINE # 63001:BD     LINE # 63012:IG
LINE # 63002:FO     LINE # 63013:EN
LINE # 63003:ND     LINE # 63014:GJ
LINE # 63004:DJ     LINE # 63015:IK
LINE # 63005:LP     LINE # 63016:HG
LINE # 63006:JB     LINE # 63017:CK
LINE # 63007:JF     LINE # 63018:JF
LINE # 63008:KA     LINE # 63019:OH
LINE # 63009:HP     LINE # 63020:LH
LINE # 63010:KJ     LINES: 21
```

C-64 BUG REPELLENT

By Michael Kleinert and David Barron

The program listed below will allow you to quickly debug any *Ahoy!* program you type in on your C-64.

Type in, save, and run the *Bug Repellent*. Type NEW, then type in the *Ahoy!* program you wish to check. When that's done, save your program (don't run it!) and type SYS 49152 RETURN. You'll be asked if you want the line value codes displayed on the screen or dumped to the printer. If you select screen, it will appear there.

The table will move quickly, too quickly for most mortals to follow. To pause the listing depress and hold the SHIFT key. To pause for an extended period, depress SHIFT LOCK. As long as it is locked, the display will remain frozen.

Compare the table your machine generates to the table in *Ahoy!* that follows the program you're entering: If you spot a difference, an error exists in that line. Jot down the numbers of lines where contradictions occur, LIST each line, spot the errors, and correct them.

```
•5000 FOR X = 49152 TO 49488 :READ
 Y:POKE X,Y:NEXT:END
•5001 DATA 32, 161, 192, 165, 43,
133, 251, 165, 44, 133
•5002 DATA 252, 160, 0, 132, 254,
32, 37, 193, 234, 177
•5003 DATA 251, 208, 3, 76, 138, 1
92, 230, 251, 208, 2
•5004 DATA 230, 252, 76, 43, 192,
76, 73, 78, 69, 32
•5005 DATA 35, 32, 0, 169, 35, 160
, 192, 32, 30, 171
•5006 DATA 160, 0, 177, 251, 170,
230, 251, 208, 2, 230
•5007 DATA 252, 177, 251, 32, 205,
 189, 169, 58, 32, 210
•5008 DATA 255, 169, 0, 133, 253,
230, 254, 32, 37, 193
•5009 DATA 234, 165, 253, 160, 0,
76, 13, 193, 133, 253
•5010 DATA 177, 251, 208, 237, 165
, 253, 41, 240, 74, 74
•5011 DATA 74, 74, 24, 105, 65, 32
, 210, 255, 165, 253
•5012 DATA 41, 15, 24, 105, 65, 32
, 210, 255, 169, 13
•5013 DATA 32, 220, 192, 230, 63,
208, 2, 230, 64, 230
•5014 DATA 251, 208, 2, 230, 252,
76, 11, 192, 169, 153
•5015 DATA 160, 192, 32, 30, 171,
166, 63, 165, 64, 76
•5016 DATA 231, 192, 96, 76, 73, 7
8, 69, 83, 58, 32
•5017 DATA 0, 169, 247, 160, 192,
32, 30, 171, 169, 3
•5018 DATA 133, 254, 32, 228, 255,
 201, 83, 240, 6, 201
•5019 DATA 80, 208, 245, 230, 254,
 32, 210, 255, 169, 4
•5020 DATA 166, 254, 160, 255, 32,
 186, 255, 169, 0, 133
•5021 DATA 63, 133, 64, 133, 2, 32
, 189, 255, 32, 192
•5022 DATA 255, 166, 254, 32, 201,
 255, 76, 73, 193, 96
•5023 DATA 32, 210, 255, 173, 141,
 2, 41, 1, 208, 249
•5024 DATA 96, 32, 205, 189, 169,
13, 32, 210, 255, 32
•5025 DATA 204, 255, 169, 4, 76, 1
95, 255, 147, 83, 67
•5026 DATA 82, 69, 69, 78, 32, 79,
 82, 32, 80, 82
•5027 DATA 73, 78, 84, 69, 82, 32,
 63, 32, 0, 76
•5028 DATA 44, 193, 234, 177, 251,
 201, 32, 240, 6, 138
•5029 DATA 113, 251, 69, 254, 170,
 138, 76, 88, 192, 0
•5030 DATA 0, 0, 0, 230, 251, 208,
 2, 230, 252, 96
•5031 DATA 170, 177, 251, 201, 34,
 208, 6, 165, 2, 73
•5032 DATA 255, 133, 2, 165, 2, 20
8, 218, 177, 251, 201
•5033 DATA 32, 208, 212, 198, 254,
 76, 29, 193, 0, 169
•5034 DATA 13, 76, 210, 255, 0, 0,
 0
```

BUG REPELLENT LINE CODES FOR C-64 BUG REPELLENT

```
LINE # 5000:GJ        LINE # 5018:FK
LINE # 5001:DL        LINE # 5019:FL
LINE # 5002:DB        LINE # 5020:CL
LINE # 5003:OF        LINE # 5021:GC
LINE # 5004:KN        LINE # 5022:NN
LINE # 5005:CA        LINE # 5023:NH
LINE # 5006:CE        LINE # 5024:IM
LINE # 5007:JE        LINE # 5025:KC
LINE # 5008:CL        LINE # 5026:DC
LINE # 5009:NB        LINE # 5027:ML
LINE # 5010:MB        LINE # 5028:GN
LINE # 5011:EP        LINE # 5029:JK
LINE # 5012:GH        LINE # 5030:NA
LINE # 5013:AN        LINE # 5031:DM
LINE # 5014:NG        LINE # 5032:JA
LINE # 5015:BF        LINE # 5033:FM
LINE # 5016:EP        LINE # 5034:PA
LINE # 5017:PJ        LINES: 35
```

PROGRAMMERS! Ahoy! *is looking for original C-64 and VIC 20 programs of exceptional quality. Send a copy of yours on disk or tape, accompanied by a printout, an introductory article, and a stamped and self-addressed mailer.*

MICRO MINDER

FROM PAGE 98

```
1 REM ****** MICRO - MINDER ******
2 REM ******** DESIGNED BY ********
3 REM ** BOB LLORET AND JOE FUSCO **
4 REM ***** FOR AHOY! MAGAZINE *****
5 REM
20 REM ****** TITLE SCREEN ******
30 REM ==========================
40 PRINT "{SC}":POKE 53280,0:POKE 53281,0:PRINT
80 PRINT TAB(8);"{RD}{RV} *{RO} {RV}£ {RO} Q"
90 PRINT TAB(8);"{YL}{RV}  *£  "
100 PRINT TAB(8);"{GN}{RV}  {RO}* £{RV}  {RO} {RV} {RO} {RV}   {RO} {RV}   {RO} {RV}   "
110 PRINT TAB(8);"{CY}{RV}  {RO} {RV}  {RO} {RV} {RO} {RV} {RO} {RV} {RO} {RV} {RO}   {RV} {RO} {RV} "
120 PRINT TAB(8);"{BL}{RV}  {RO} {RV}  {RO} {RV} {RO} {RV}   {RO} {RV} {RO}   {RV}   "
130 PRINT
140 PRINT TAB(8);"{PU}{RV} *{RO} {RV}£ {RO} Q        {RV} "
150 PRINT TAB(8);"{BR}{RV}  *£  {RO}        {RV} "
160 PRINT TAB(8);"{LB}{RV}  {RO}* £{RV}  {RO} {RV} {RO} {RV}  *{RO} {RV}   {RO} {RV} {RO}UU {RV}   "
170 PRINT TAB(8);"{YL}{RV}  {RO} {RV}  {RO} {RV} {RO} {RV} {RO} {RV} {RO} {RV} {RO} {RV} {RO} {RV} {RO} {RV} {RO}I  {RV} "
180 PRINT TAB(8);"{CY}{RV}  {RO} {RV}  {RO} {RV} {RO} {RV} {RO} {RV} {RO} {RV}   {RO} {RV} {RO}II {RV} ":PRINT:PRINT
185 PRINT "{BL}{RV}{CU}{40 SPACES}"
190 FOR A=1 TO 7:PRINT"{BL}{RV}{CU} BBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBB ":NEXT A
192 PRINT "{BL}{RV}{CU}{40 SPACES}"
195 PRINT "{CU}{CU}{CU}{CU}{CU}{CU}{CU}{CU}{CU}"
200 MSG$="{15 SPACES}** DESIGNED BY.....BOB LLORET AND JOE FUSCO **"
205 PRINT TAB(5);"{BL}+++++++++++++++++++++++++++++"
206 PRINT TAB(5);"{CU}+{28 SPACES}+"
210 PRINT TAB(5);"++++++++++++++++++++++++++++++":PRINT "{CU}{CU}{CU}"
215 M$=RIGHT$(MSG$,LEN(MSG$)-1):C$=M$+LEFT$(MSG$,1)
220 PRINT TAB(6);"{CU}{CY}{RV}";LEFT$(C$,28):MSG$=C$
225 FOR D=1 TO 70:NEXT D:MSG=MSG+1:IF MSG=110 THEN 240
230 GOTO 215
240 A$(1)="@0:INDX-MON,S,R"
250 A$(2)="@0:INDX-DAT,S,R"
260 A$(3)="@0:INDX-NAM,S,R":C$="0"
270 N=0:C=0:SI=54272:FOR SO=0 TO 24:POKE SO+SI,0:NEXT SO
280 PRINT "{HM}":DIM A(5,7),MO$(600),DT$(600),NA$(2000),DT(600)
290 GOTO 10000
300 PRINT "{SC}":POKE 53280,4:POKE 53281,1:PRINT:S=0:HI=37:LO=162:GOSUB 11000
305 REM ***** MAIN MENU *****
306 REM ======================
310 PRINT TAB(5);"{PU}A***************************S"
315 PRINT TAB(5);"{PU}B *  {BL}S E L E C T I O N S  {PU}* B"
320 PRINT TAB(5);"{PU}Z***************************X"
330 PRINT TAB(10);"{CD}{CD}{CD}{PU}{RV}[1]{RO} {BL}ADD APP'TS"
340 PRINT TAB(10);"{CD}{PU}{RV}[2]{RO} {BL}DELETE APP'TS"
350 PRINT TAB(10);"{CD}{PU}{RV}[3]{RO} {BL}LIST APP'TS"
360 PRINT TAB(10);"{CD}{PU}{RV}[4]{RO} {BL}CHECK APP'TS"
```

```
•370 PRINT TAB(10);"{CD}{PU}{RV}[5
 ]{RO} {BL}TERMINATE SESSION"
•380 PRINT TAB(10);"{BL}{CD}{CD}{C
 D}{CD}YOUR CHOICE {PU}{RV}[1-5]{R
 O}"
•385 GET CHOICE:IF CHOICE=0 THEN 3
 85
•399 HI=33:LO=135:GOSUB 11000
•400 IF CHOICE=1 THEN C=0:GOTO 500
•410 IF CHOICE=2 THEN C=0:GOTO 700
•420 IF CHOICE=3 THEN 1420
•430 IF CHOICE=4 THEN 1600
•440 IF CHOICE=5 THEN 1100
•498 REM *** ADD APPOINTMENTS ***
•499 REM ========================
•500 PRINT "{SC}":POKE 53280,2:POK
 E 53281,1:N=N+1:C=C+1
•505 PRINT "{RD}{CU}BBBBBBBBBBBBBB
 BBBBBBBBBBBBBBBBBBBBBBBBBB"
•506 PRINT "{RD}{CU}BBBBBBBBBBB
 {18 SPACES}BBBBBBBBBBB"
•510 PRINT "{CU}BBBBBBBBBBB {BL}AD
 D APPOINTMENTS {RD}BBBBBBBBBBB"
•515 PRINT "{RD}{CU}BBBBBBBBBBBDDD
 DDDDDDDDDDDDDDDBBBBBBBBBBB"
•520 FOR A=1 TO 4:PRINT:NEXT A
•530 PRINTTAB(10);"ENTER MONTH";:I
 NPUT MO$(N):IFMO$(N)="" THEN PRIN
 T"{CU}{CU}":GOTO530
•540 PRINTTAB(10);"{CD}ENTER DATE"
 ;:INPUT DT$(N):IFDT$(N)="" THENPR
 INT"{CU}{CU}{CU}":GOTO540
•545 PRINT
•550 PRINTTAB(10);"ENTER NAME";:IN
 PUTNA$(N):IFNA$(N)=""THENPRINT"{C
 U}{CU}":GOTO550
•570 PRINT TAB(13);"{BL}{CD}{CD}{C
 D}{CD}{CD}{CD}ANY MORE (Y/N)"
•590 GET AN$:IF AN$="" THEN 590
•600 IF AN$="Y" THEN 500
•610 PRINT TAB(8);"{CD}{RD}";C;"AP
 P'TS WERE ADDED":FORZ=1TO1500:NEX
 T:GOTO300
•698 REM **** DELETE APP'TS ****
•699 REM ========================
•700 PRINT "{SC}":POKE 53280,6:POK
 E 53281,1:C=C+1
•710 PRINT "{CU}{BL}BBBBBBBBBBBBBB
 BBBBBBBBBBBBBBBBBBBBBBBBBB"
•711 PRINT "{CU}{BL}BBBBBBBBBB
 {21 SPACES}BBBBBBBBBB"
•715 PRINT "{CU}{BL}BBBBBBBBBB {RD
 }DELETE APPOINTMENTS {BL}BBBBBBBB
 B"
•720 PRINT "{CU}BBBBBBBBBBBDDDDDDD
 DDDDDDDDDDDDDDBBBBBBBBB"
•730 FOR A=1 TO 5:PRINT:NEXT A:PRI
 NT TAB(10);"{RD}ENTER APP'T NO.";
 :INPUT DL
•740 MO$(DL)="***":DT$(DL)="**":NA
 $(DL)="*****"
•750 FOR A=1 TO 9:PRINT:NEXT A
•760 PRINT TAB(13);"{BL}ANYMORE [Y
 /N]"
•770 GET AN$:IF AN$="" THEN 770
•780 IF AN$="Y" THEN 700
•790 PRINT TAB(8);"{CD}";C;"{RD}AP
 P'TS WERE DELETED":FOR D=1 TO 150
 0:NEXT D
•800 GOTO 300
•1100 REM ** WRITE FILE ROUTINE **
•1110 REM ========================
•1115 FG=0
•1120 OPEN2,8,2,"@0:INDX-MON,S,W"
•1130 FOR J=1 TO N
•1135 IFMO$(J)="**"THEN FG=FG+1:GO
 TO1181
•1180 PRINT#2,MO$(J)
•1181 NEXT
•1182 CLOSE2
•1190 OPEN2,8,2,"@0:INDX-DAT,S,W"
•1191 FORJ=1 TO N
•1195 IF DT$(J)="**" THEN 1202
•1200 PRINT#2,DT$(J)
•1202 NEXT
•1203 CLOSE2
•1210 OPEN2,8,2,"@0:INDX-NAM,S,W"
•1220 FOR J=1 TO N
•1222 IF NA$(J)="**" THEN 1232
•1230 PRINT#2,NA$(J)
•1232 NEXT
•1233 CLOSE2
•1240 OPEN2,8,2,"@0:INDX-LIST,S,W"
•1250 PRINT#2,N-FG:CLOSE2
•1260 PRINT "{SC}{CY}":POKE 53280,
 14:POKE 53281,6:END
•1400 REM *** LIST APP'TS ***
•1410 REM ====================
•1420 PRINT"{SC}":POKE 53280,9:POK
 E 53281,7:I=0
•1430 PRINT "{BR}{CU}BBBBBBBBBBBBB
 BBBBBBBBBBBBBBBBBBBBBBBBBB"
•1435 PRINT "{BR}{CU}BBBBBBBBBBB
 {19 SPACES}BBBBBBBBBBB"
•1440 PRINT "{CU}BBBBBBBBBBB {BK}L
 IST APPOINTMENTS {BR}BBBBBBBBBB"
```

```
1445 PRINT "{CU}BBBBBBBBBBBDDDDDD
DDDDDDDDDDDDBBBBBBBBBBB":TA=10
1460 FOR J=1 TO N:I=I+1:IF J>9 TH
EN TA=9
1465 PRINTTAB(TA);"{BK}";J;" ";
1470 PRINT MO$(J);" ";
1480 PRINT DT$(J);", ";
1490 PRINT NAME$(J)
1500 IF I=16 THEN 1520
1510 NEXT J
1520 PRINT TAB(4);"{BR}{CD}PRESS
F1 FOR MORE {BK}OR {BR}F3 FOR MEN
U"
1530 GET AN$:IF AN$="" THEN 1530
1540 IF AN$="{F1}" AND I=16 THEN
I=0:GOSUB 2300:GOTO 1510
1550 GOTO 300
1598 REM **** CHECK APP'TS ****
1599 REM =====================
1600 PRINT "{SC}":POKE 53280,6:PO
KE 53281,7
1605 PRINT:PRINT TAB(11);"{BK}* C
HECK APP'TS *"
1610 FOR A=1 TO 7:PRINT:NEXT A
1620 PRINT TAB(6);"{BL}WHICH MONT
H? (JAN-DEC)";:INPUT MN$
1630 IF MN$="JAN" THEN DAY=3:DYS=
31
1640 IF MN$="FEB" THEN DAY=18:DYS
=29
1650 IF MN$="MAR" THEN DAY=23:DYS
=31
1660 IF MN$="APR" THEN DAY=3:DYS=
30
1670 IF MN$="MAY" THEN DAY=13:DYS
=31
1680 IF MN$="JUN" THEN DAY=28:DYS
=30
1690 IF MN$="JUL" THEN DAY=3:DYS=
31
1700 IF MN$="AUG" THEN DAY=18:DYS
=31
1710 IF MN$="SEP" THEN DAY=33:DYS
=30
1720 IF MN$="OCT" THEN DAY=8:DYS=
31
1730 IF MN$="NOV" THEN DAY=23:DYS
=30
1740 IF MN$="DEC" THEN DAY=33:DYS
=31
1745 GOSUB 2000
1746 FORSO=1TO35:Q=INT(RND(0)*200
)+1:POKE SI+24,15:POKE SI+5,2:POK
E SI+6,50
1747 POKE SI+4,17:POKE SI+1,Q:POK
E SI,Q:FOR D=1 TO 10:NEXT D:NEXT
SO
1748 POKE SI+4,32:POKE SI+1,0:POK
E SI,0
1750 GOSUB 2200
1751 P=POS(0):IF P>0 THEN L2=7
1752 IF P=12 AND MN$="DEC" THEN L
2=4
1753 IF P=12 AND MN$="APR" THEN L
2=7
1754 IF P=0 OR P=7 THEN L2=4
1755 FOR L=1 TO L2:PRINT:NEXT L:P
RINT TAB(9);"{BL}PRESS {RD}F1 {BL
}FOR MAIN MENU"
1756 PRINT "{CU}{CU}{CU}{CU}{CU}"
1760 FOR J=1 TO N
1770 IF MO$(J)<>MN$ THEN 1810
1780 PRINT TAB(22);"{CU}";DT$(J);
"-";NA$(J)
1790 GET AN$:IF AN$="" THEN 1790
1795 IF AN$="{F1}" THEN 300
1796 IF AN$=CHR$(32) THEN 1805
1800 IF AN$<>"{F1}" OR AN$<>CHR$(
32) THEN 1790
1805 PRINT TAB(22);"{CU}
    {SS}"
1810 NEXT J
1820 PRINT TAB(22);"{CU}{BL}NO MO
RE APP'TS"
1830 GET AN$:IF AN$="" THEN 1830
1840 GOTO 300
1998 REM *** DRAW CALENDAR ***
1999 REM =====================
2000 PRINT "{SC}":POKE 53280,2:PO
KE 53281,15
2005 PRINT TAB(12);"{BL}{CU}DATE:
";MN$;" 1984"
2010 PRINT:PRINT "{RD}    SUN  MO
N  TUE  WED  TH  FRI  SAT"
2020 PRINT "{BK}  ACCCCRCCCCRCCCC
RCCCCRCCCCRCCCCR****S"
2030 PRINT "  B    B    B    B
 B    B    B    B"
2040 PRINT "  B    B    B    B
 B    B    B    B"
2050 PRINT "  QC***+****+****+***
*+****+****+****W"
2060 PRINT "  B    B    B    B
 B    B    B    B"
2070 PRINT "  B    B    B    B
 B    B    B    B"
```

```
•2080 PRINT "  QC***+****+****+***
*+****+****+****W"
•2090 PRINT "  B    B    B    B
 B    B    B    B"
•2100 PRINT "  B    B    B    B
 B    B    B    B"
•2110 PRINT "  QC***+****+****+***
*+****+****+****W"
•2120 PRINT "  B    B    B    B
 B    B    B    B"
•2130 PRINT "  B    B    B    B
 B    B    B    B"
•2140 PRINT "  QC***+****+****+***
*+****+****+****W"
•2150 PRINT "  B    B    B    B
 B    B    B    B"
•2160 PRINT "  B    B    B    B
 B    B    B    B"
•2170 PRINT "  Q****+****+****E***
*E****E****E****X"
•2180 PRINT "  B    B    B":PRINT
"  B    B    B"
•2185 PRINT "  Z****E****X";
•2190 PRINT "{RD}{CU}{CU}  APP'T:"
:RETURN
•2200 T=DAY:PRINT "{HM}":CNT=0:J=1
•2210 FOR B=1 TO 5:FOR C=1 TO 7:CN
T=CNT+1
•2220 A(B,C)=CNT:NEXT C:NEXT B:PRI
NT "{CD}{CD}"
•2224 FOR J=1 TO N
•2225 IFMO$(J)=MN$ THEN 2230
•2226 NEXT J
•2230 FOR B=1 TO 5:FOR C=1 TO 7
•2235 DT(J)=VAL(DT$(J))
•2240 IF MO$(J)<>MN$ THEN 2255
•2245 IF DT(J)<>A(B,C) THEN  2255
•2250 GOTO 2260
•2255 PRINT TAB(T);"{BK}";A(B,C);:
GOTO 2265
•2260 PRINT TAB(T);A(B,C);"{CD}{CL
}{CL}{RD}*{CU}{CR}{BK}";:J=J+1
•2265 T=T+5:IF T>35 THEN T=3:FOR L
=1 TO 3:PRINT:NEXT L
•2270 IF A(B,C)>=DYS THEN 2290
•2280 NEXT C:NEXT B
•2290 RETURN
•2298 REM **** ERASE SCREEN ****
•2299 REM ======================
•2300 PRINT "{HM}":FOR A=1 TO 2:PR
INT:NEXT A
•2310 FOR A=1 TO 18:PRINT"
{38 SPACES}                    ":N
EXT A
•2320 PRINT "{HM}":PRINT "{CD}{CD}
":RETURN
•4998 REM **** OPEN NEW FILE ****
•4999 REM ======================
•5000 PRINT"{SC}";:PRINT"{CD}{CD}{
CD}{CD}{CD}{CD}{CD}{CD}{CR}{CR}{C
R}{CR}{RV}CREATING CALENDAR"
•5005 FORX=1TO3
•5010 OPEN2,8,2,A$(X)
•5015 PRINT#2,C$
•5020 CLOSE2
•5025 NEXTX
•5030 OPEN2,8,2,"@0:INDX-LIST,S,W"
•5035 PRINT#2,0:CLOSE2:GOTO10000
•5998 REM **** READ FILE ****
•5999 REM ===================
•6000 PRINT "{SC}":POKE 53280,0:PO
KE 53281,9:FORA=1TO7:PRINT:NEXTA
•6005 PRINT TAB(10);"{YL}ONE MOMEN
T PLEASE..."
•6006 PRINT TAB(5);"{CD}{CD}I'M LO
ADING YOUR APPOINTMENTS"
•6010 OPEN2,8,2,"@0:INDX-LIST,S,R"
•6015 INPUT#2,N:CLOSE2:IFN=0THEN30
0
•6025 OPEN2,8,2,A$(1)
•6030 FORX=1TON
•6035 INPUT#2,MO$(X):NEXTX:CLOSE2
•6040 OPEN2,8,2,A$(2)
•6045 FORX=1TON
•6050 INPUT#2,DT$(X):NEXTX:CLOSE2
•6060 OPEN2,8,2,A$(3)
•6065 FORX=1TON
•6070 INPUT#2,NA$(X):NEXTX:CLOSE2:
GOTO300
•10000 PRINT "{SC}":POKE 53280,0:P
OKE 53281,0
•10003 PRINT TAB(15);"{RD}UCCCCCCC
CI"
•10004 PRINT TAB(11);"UCCCCCCCCCCC
CCCCCI"
•10005 PRINT TAB(7);"CCC<B{BL}* MI
CRO-MINDER *{RD}B>CCC"
•10006 PRINT TAB(11);"JCCCCCCCCCCC
CCCCCK"
•10007 PRINT TAB(15);"JCCCCCCCCK"
•10010 FOR A=1 TO 5:PRINT:NEXT A
•10020 PRINT TAB(12);"{BL}{RV}[1]{
RO} NEW CALENDAR":PRINT TAB(12);"
{CD}{CD}{RV}[2]{RO} OLD CALENDAR"
•10030 FOR A=1 TO 8:PRINT:NEXT A
•10040 PRINT TAB(11);"{CY}ENTER CH
```

```
OICE {RV}[1-2]"
•10050 GET Q:IF Q=0 THEN 10050
•10060 ON Q GOTO 5000,6000
•11000 REM
•11010 POKE SI+24,15:POKE SI+5,2:P
 OKE SI+6,100:POKE SI+4,33
•11020 POKE SI+1,HI:POKE SI,LO:FOR
  D=1 TO 130:NEXT D
•11030 POKE SI+4,16:POKE SI+1,0:PO
 KE SI,0:RETURN
```

BUG REPELLENT LINE CODES FOR MICRO MINDER

```
LINE # 1:AB
LINE # 2:OG
LINE # 3:LN
LINE # 4:MF
LINE # 5:JD
LINE # 20:NO
LINE # 30:ME
LINE # 40:ND
LINE # 80:HK
LINE # 90:PO
LINE # 100:EI
LINE # 110:PA
LINE # 120:DH
LINE # 130:JJ
LINE # 140:CH
LINE # 150:KC
LINE # 160:FD
LINE # 170:OH
LINE # 180:LH
LINE # 185:OJ
LINE # 190:GD
LINE # 192:OJ
LINE # 195:PB
LINE # 200:PD
LINE # 205:HH
LINE # 206:AI
LINE # 210:PA
LINE # 215:DB
LINE # 220:CJ
LINE # 225:ML
LINE # 230:CC
LINE # 240:EB
LINE # 250:LN
LINE # 260:DP
LINE # 270:CB
LINE # 280:GH
LINE # 290:IE
LINE # 300:FH
LINE # 305:LO
LINE # 306:CD
LINE # 310:ID
LINE # 315:FA
LINE # 320:NL
LINE # 330:CL
LINE # 340:AA
LINE # 350:DD
LINE # 360:PB
LINE # 370:BG
LINE # 380:IN
LINE # 385:DB
LINE # 399:MD
LINE # 400:IJ
LINE # 410:EM
LINE # 420:KP
LINE # 430:JE
LINE # 440:KI
LINE # 498:MM
LINE # 499:HL
LINE # 500:IE
LINE # 505:GH
LINE # 506:GH
LINE # 510:DH
LINE # 515:ON
LINE # 520:FM
LINE # 530:GM
LINE # 540:NB
LINE # 545:JJ
LINE # 550:FJ
LINE # 570:MC
LINE # 590:EI
LINE # 600:OO
LINE # 610:LH
LINE # 698:HL
LINE # 699:CD
LINE # 700:BG
LINE # 710:FB
LINE # 711:LB
LINE # 715:FL
LINE # 720:BC
LINE # 730:GH
LINE # 740:CK
LINE # 750:FD
LINE # 760:DI
LINE # 770:EM
LINE # 780:PA
LINE # 790:EP
LINE # 800:BP
LINE # 1100:AA
LINE # 1110:HL
LINE # 1115:GM
LINE # 1120:BA
LINE # 1130:JI
LINE # 1135:FM
LINE # 1180:EJ
LINE # 1181:IA
LINE # 1182:NC
LINE # 1190:BB
LINE # 1191:JI
LINE # 1195:JK
LINE # 1200:EN
LINE # 1202:IA
LINE # 1203:NC
LINE # 1210:PE
LINE # 1220:JI
LINE # 1222:KK
LINE # 1230:EC
LINE # 1232:IA
LINE # 1233:NC
LINE # 1240:LJ
LINE # 1250:IG
LINE # 1260:FL
LINE # 1400:GK
LINE # 1410:HD
LINE # 1420:CK
LINE # 1430:PB
LINE # 1435:CE
LINE # 1440:FN
LINE # 1445:JN
LINE # 1460:IN
LINE # 1465:IK
LINE # 1470:OI
LINE # 1480:AF
LINE # 1490:JH
LINE # 1500:GC
LINE # 1510:MM
LINE # 1520:HK
LINE # 1530:GO
LINE # 1540:NE
LINE # 1550:BP
LINE # 1598:PF
LINE # 1599:PM
LINE # 1600:OO
LINE # 1605:OA
LINE # 1610:GJ
LINE # 1620:NH
LINE # 1630:OK
LINE # 1640:AP
LINE # 1650:EL
LINE # 1660:OH
LINE # 1670:BN
LINE # 1680:BE
LINE # 1690:PM
LINE # 1700:FG
LINE # 1710:EP
LINE # 1720:OG
LINE # 1730:IP
LINE # 1740:CI
LINE # 1745:FL
LINE # 1746:II
LINE # 1747:MJ
LINE # 1748:GL
LINE # 1750:FF
LINE # 1751:GH
LINE # 1752:NM
LINE # 1753:AE
LINE # 1754:MN
LINE # 1755:PG
LINE # 1756:KN
LINE # 1760:JI
LINE # 1770:HK
LINE # 1780:FD
LINE # 1790:FC
LINE # 1795:BA
LINE # 1796:BH
LINE # 1800:KD
LINE # 1805:EM
LINE # 1810:MM
LINE # 1820:BF
LINE # 1830:GJ
LINE # 1840:BP
LINE # 1998:MI
LINE # 1999:KC
LINE # 2000:AO
LINE # 2005:PL
LINE # 2010:LG
LINE # 2020:CJ
LINE # 2030:MB
LINE # 2040:MB
LINE # 2050:HA
LINE # 2060:MB
LINE # 2070:MB
LINE # 2080:HA
LINE # 2090:MB
LINE # 2100:MB
LINE # 2110:HA
LINE # 2120:MB
```

IMPORTANT
Before typing in an *Ahoy!* program, refer to the first two pages of the program listings section.

```
LINE # 2130:MB    LINE # 5025:NK
LINE # 2140:HA    LINE # 5030:LJ
LINE # 2150:MB    LINE # 5035:PE
LINE # 2160:MB    LINE # 5998:CL
LINE # 2170:NH    LINE # 5999:CH
LINE # 2180:OG    LINE # 6000:LG
LINE # 2185:IP    LINE # 6005:DB
LINE # 2190:OL    LINE # 6006:LG
LINE # 2200:IC    LINE # 6010:LG
LINE # 2210:NN    LINE # 6015:HI
LINE # 2220:FO    LINE # 6025:NF
LINE # 2224:JI    LINE # 6030:KO
LINE # 2225:NA    LINE # 6035:JK
LINE # 2226:MM    LINE # 6040:NC
LINE # 2230:FD    LINE # 6045:KO
LINE # 2235:ED    LINE # 6050:GO
LINE # 2240:KE    LINE # 6060:ND
LINE # 2245:CJ    LINE # 6065:KO
LINE # 2250:FL    LINE # 6070:MD
LINE # 2255:HH    LINE # 10000:OD
LINE # 2260:GI    LINE # 10003:DK
LINE # 2265:CA    LINE # 10004:PK
LINE # 2270:JN    LINE # 10005:EB
LINE # 2280:LN    LINE # 10006:PF
LINE # 2290:IM    LINE # 10007:OJ
LINE # 2298:AI    LINE # 10010:GH
LINE # 2299:PM    LINE # 10020:GJ
LINE # 2300:HJ    LINE # 10030:EI
LINE # 2310:OD    LINE # 10040:KM
LINE # 2320:OJ    LINE # 10050:LJ
LINE # 4998:AI    LINE # 10060:EL
LINE # 4999:CD    LINE # 11000:JD
LINE # 5000:IG    LINE # 11010:LH
LINE # 5005:JF    LINE # 11020:AO
LINE # 5010:OM    LINE # 11030:DM
LINE # 5015:GB    LINES: 258
LINE # 5020:NC
```

DIRECTORY ASSISTANCE

FROM PAGE 41

C-64 VERSION

```
1 REM<<****C64PRINT$****>>
2 REM<<**JOYCELYN WOODS**>
3 REM<<<<**MARCH 1984**>>>
4 REM<<<<<<**AHOY!**>>>>>>
5 REM<<*****************>>
10 POKE53280,12:POKE53281,12
15 PRINT"{SC}{WH}{RV}WAIT...SETTI
NG UP{RO}{BL}"
20 K=0:GOSUB2000
100 REM<**DIRECTORY ROUTINE
105 OPEN15,8,15:GOSUB2075
110 OPEN1,8,0,"$0"
115 PRINT"{HM}{WH}{RV}DIRECTORY O
PEN{RO}{BL}     "
120 GET#1,L1$,L2$
125 GET#1,L1$,L2$
130 GET#1,L1$,L2$
135 C=0
140 IFL1$<>""THENC=ASC(L1$)
145 IFL2$<>""THENC=C+ASC(L2$)*256
150 BK$(K)=MID$(STR$(C),2):BL=VAL
(BK$(K))
155 BK$(K)=RIGHT$(SG$+BK$(K),3)
160 BL=BL*256:BY$(K)=RIGHT$(SG$+S
TR$(BL),5)
165 GET#1,L2$:IFST<>0THEN305
170 IFL2$<>CHR$(34)THEN165
175 GET#1,L2$:IFL2$<>CHR$(34)THEN
N$=N$+L2$:GOTO175
180 P$(K)=N$:N$=""
185 GET#1,L2$:IFL2$=CHR$(32)THEN1
85
190 C$=""
195 C$=C$+L2$:GET#1,L2$:IFL2$<>""
THEN195
200 TY$(K)=LEFT$(C$,3)
205 IFK=0THEN225
210 PRINT"{HM}{WH}{RV}"TAB(15)K"{
RO}"
215 BU=BU+VAL(BK$(K))
220 IFST=0THENK=K+1:GOTO125
225 PRINT"{SC}{CD}{CD}{CD}{CD}{G3
}{RV}   {12 SPACES} DISK INFORMATION
 {12 SPACES}   {RO}";
230 PRINT"{RV}NAME: {WH}"P$(0)"{G
3}           ID: {WH}"TY$(0)"{G3}
";
235 PRINT"{RV}BLOCKS USED:
 BLOCKS FREE:          ";
240 PRINT"{RV}TOTAL NUMBER OF ENT
RIES:{16 SPACES}         ";
245 PRINT"{RV}           {33 SPACES}
          JW>3/84{RO}"
250 PRINT"{HM}{WH}{RV}READING ENT
RY:       {RO}":K=K+1:GOTO125
300 REM<**READ LOAD ADDRESS
305 CLOSE1:GOSUB2085:GOSUB2075:K=
K-1:BF=664-BU:PK$=RIGHT$(SG$+STR$
(K),5)
310 US$=RIGHT$(SG$+STR$(BU),5):FR
$=RIGHT$(SG$+STR$(BF),5)
315 PRINT"{HM}{WH}{RV}READING FIL
```

```
ES:       {RO}":PRINT"{CD}{CD}{CD}
{CD}{WH}"
320 PRINTTAB(13)"{RV}"US$TAB(33)F
R$SPC(29)PK$
325 FORI=1TOK:F$=P$(I)
330 OPEN1,8,3,"0:"+F$:PRINT"{HM}{
WH}{RV}"TAB(15)I"{RO}"
335 GET #1,LB$,HB$
340 IFHB$=""THENH=0:GOTO350
345 H=ASC(HB$)
350 H=H*256
355 IFLB$=""THENL=0:GOTO365
360 L=ASC(LB$)
365 LA$(I)=RIGHT$(SG$+STR$(H+L),5
)
370 CLOSE1:NEXT
375 GOSUB2085
380 PRINT"{HM}{WH}{RV}END OF DIRE
CTORY{RO}           "
385 CLOSE15
400 REM<**PRINT DIRECTORY
405 I=1:I$=CHR$(32)+STR$(I)+CHR$(
46):LP=6:KOUNT=9
410 PRINT"{HM}{WH}{RV}PRINTER OPE
N{RO}       "
415 OPEN3,4,3:CMD3:OPEN5,3,5
420 PRINT#5,"{HM}{WH}{RV}PRINTING
 DIRECTORY{RO}"
425 PRINT#3,CHR$(14)SPC(9)"* {RV}
"P$(0)"{RO} *"CHR$(15)R$
430 PRINT#3,T$"15{RV}# ENTRIES:{R
O}"T$"26"PK$T$"45"US$" {RV}BLOCKS
 USED{RO}"R$
435 PRINT#3,T$"15{RV}DISK ID:{RO}
"T$"29"TY$(0)T$"45"FR$" {RV}BLOCK
S FREE{RO}"R$
440 PRINT#3,T$"12NO"T$"20NAME"T$"
40BLOCKS"T$"50BYTES"T$"60L.ADD"T$
"71TYPE"
445 PRINT#3,DD$DD$
450 PRINT#3,T$"11"I$T$"20"P$(I)T$
"41"BK$(I)T$"50"BY$(I)T$"60"LA$(I
)T$"72"TY$(I)
455 KOUNT=KOUNT+1
460 IFI=KTHENPRINT#3,DD$DD$:KOUNT
=KOUNT+1:GOSUB2045:GOTO490
465 IFI=LPTHENGOSUB2035:LP=LP+6:K
OUNT=KOUNT+1
470 IFI=36THENGOSUB2065:PRINT#3,T
$"10{RV}PAGE 2{RO} "P$(0):GOSUB20
35:GOTO485
475 IFI=90THENGOSUB2040:PRINT#3,T
$"10{RV}PAGE 3{RO} "P$(0):GOSUB20
35:GOTO485
480 IFI=144THENPRINT#3,DD$DD$:GOS
UB2040:GOTO490
485 I=I+1:I$=RIGHT$(SG$+STR$(I)+C
HR$(46),4):GOTO450
490 CLOSE3:CLOSE5
500 REM<**ANOTHER/END PROGRAM
505 PRINT"{HM}{WH}{RV}ANOTHER DIS
K? Y/N {RO}"
510 FORI=0TO28:POKEBEEP+I,0:NEXT
515 POKEBEEP+1,130:POKEBEEP+5,9:P
OKEBEEP+15,30:POKEBEEP+24,15
520 GETZ$:POKEBEEP+4,21:FORI=1TO1
000:NEXT:IFZ$<>""THEN530
525 GETZ$:POKEBEEP+4,20:FORI=1TO1
000:NEXT:IFZ$=""THEN520
530 IFZ$="N"THENPRINT"{CD}{CD}{CD
}{CD}{CD}{CD}{CD}{CD}":END
535 IFZ$="Y"THENPRINT"{SC}":CLR:G
OTO10
540 Z$="":GOTO520
2000 REM<**VARIABLES
2005 DIMP$(145),BK$(145),TY$(145)
,BY$(145),LA$(145)
2010 SG$="     ":T$=CHR$(16):R$=CH
R$(13):BEEP=54272
2015 DD$=".......................
................."
2020 DL$="***********************
*****************"
2025 RETURN
2030 REM<**PRINTER SUBROUTINES
2035 PRINT#3,DL$DL$:RETURN
2040 PRINT#3:KOUNT=KOUNT+4:RETURN
2045 IFKOUNT<66THENRP=66-KOUNT:GO
TO2060
2050 IFKOUNT<132THENRP=128-KOUNT:
GOTO2060
2055 IFKOUNT<198THENRP=198-KOUNT
2060 FORI=1TORP:PRINT#3:NEXT:RETU
RN
2065 PRINT#3,R$R$R$R$R$R$R$R$R$R$
R$R$R$R$:KOUNT=KOUNT+14:RETURN
2070 REM<**DISK SUBROUTINES
2075 INPUT#15,EN,EM$,ET,ES:IFEN=0
THENRETURN
2080 PRINT"{HM}{WH}{RV}DISK ERROR
{RO} {G3}{RV}"EN;EM$;ET;ES"{RO}":
END
2085 PRINT#15,"I":RETURN
2090 REM<**PRINTING COMMENTS: TO
PRINT A DISK WITH >85PGMS
2095 REM REMOVE 3 CARRIAGE RETURN
```

IMPORTANT

Before typing in an *Ahoy!* program, refer to the first two pages of the program listings section.

```
S (R$) FROM LINE 2065
```

BUG REPELLENT LINE CODES FOR DIRECTORY ASSI$TANCE (C-64)

```
LINE # 1:DF       LINE # 350:HA     LINE # 2065:MJ
LINE # 2:KC       LINE # 355:HG     LINE # 2070:KI
LINE # 3:DM       LINE # 360:MK     LINE # 2075:BC
LINE # 4:KB       LINE # 365:EH     LINE # 2080:EG
LINE # 5:HF       LINE # 370:IK     LINE # 2085:IN
LINE # 10:LK      LINE # 375:GG     LINE # 2090:GL
LINE # 15:MG      LINE # 380:ME     LINE # 2095:CA
LINE # 20:LA      LINE # 385:AB     LINES: 105
LINE # 100:OD     LINE # 400:HF
LINE # 105:KK     LINE # 405:NH
LINE # 110:GF     LINE # 410:LC
LINE # 115:LF     LINE # 415:HI
LINE # 120:KN     LINE # 420:FA
LINE # 125:KN     LINE # 425:EC
LINE # 130:KN     LINE # 430:LG
LINE # 135:CM     LINE # 435:JM
LINE # 140:BG     LINE # 440:AJ
LINE # 145:EH     LINE # 445:FN
LINE # 150:LD     LINE # 450:BD
LINE # 155:FN     LINE # 455:IB
LINE # 160:CD     LINE # 460:LF
LINE # 165:AA     LINE # 465:AB
LINE # 170:FG     LINE # 470:KK
LINE # 175:CE     LINE # 475:AM
LINE # 180:NK     LINE # 480:BF
LINE # 185:AO     LINE # 485:MG
LINE # 190:GB     LINE # 490:OO
LINE # 195:FE     LINE # 500:EM
LINE # 200:AK     LINE # 505:BK
LINE # 205:PP     LINE # 510:AC
LINE # 210:JB     LINE # 515:MI
LINE # 215:AK     LINE # 520:KB
LINE # 220:EO     LINE # 525:LP
LINE # 225:AE     LINE # 530:OH
LINE # 230:DD     LINE # 535:EB
LINE # 235:NK     LINE # 540:NI
LINE # 240:BC     LINE # 2000:NA
LINE # 245:BC     LINE # 2005:KM
LINE # 250:DL     LINE # 2010:GM
LINE # 300:FA     LINE # 2015:KK
LINE # 305:LB     LINE # 2020:KM
LINE # 310:MB     LINE # 2025:IM
LINE # 315:NM     LINE # 2030:LC
LINE # 320:CP     LINE # 2035:DA
LINE # 325:PD     LINE # 2040:ID
LINE # 330:ME     LINE # 2045:DO
LINE # 335:NI     LINE # 2050:JK
LINE # 340:IK     LINE # 2055:IH
LINE # 345:LK     LINE # 2060:JM
```

***Would you like to format, rename, validate, or erase a disk—with one keystroke? You can—with Bob Lloret's DOS program in next month's* Ahoy!**

VIC 20 VERSION

```
•1 REM<**VICPRINT$***>
•2 REM<JOYCELYN WOODS>
•3 REM<**MARCH 1984**>
•4 REM<<<**AHOY!**>>>>
•5 REM<**************>
•10 POKE36879,25
•15 PRINT"{SC}{CY}{RV}WAIT...SETTI
NG UP{RO}{BL}"
•20 K=0:GOSUB2000
•100 REM<**DIRECTORY ROUTINE
•105 OPEN15,8,15:GOSUB2075
•110 OPEN1,8,0,"$0"
•115 PRINT"{HM}{CY}{RV}DIRECTORY O
PEN{RO}    "
•120 GET#1,L1$,L2$
•125 GET#1,L1$,L2$
•130 GET#1,L1$,L2$
•135 C=0
•140 IFL1$<>""THENC=ASC(L1$)
•145 IFL2$<>""THENC=C+ASC(L2$)*256
•150 BK$(K)=MID$(STR$(C),2):BL=VAL
(BK$(K))
•155 BK$(K)=RIGHT$(SG$+BK$(K),3)
•160 BL=BL*256:BY$(K)=RIGHT$(SG$+S
TR$(BL),5)
•165 GET#1,L2$:IFST<>0THEN305
•170 IFL2$<>CHR$(34)THEN165
•175 GET#1,L2$:IFL2$<>CHR$(34)THEN
N$=N$+L2$:GOTO175
•180 P$(K)=N$:N$=""
•185 GET#1,L2$:IFL2$=CHR$(32)THEN1
85
•190 C$=""
•195 C$=C$+L2$:GET#1,L2$:IFL2$<>""
THEN195
•200 TY$(K)=LEFT$(C$,3)
•205 IFK=0THEN225
•210 PRINT"{HM}{CY}{RV}"TAB(15)K"{
RO}"
•215 BU=BU+VAL(BK$(K))
•220 IFST=0THENK=K+1:GOTO125
•225 PRINT"{SC}{CD}{CD}{CD}{CD}{BL
```

```
}{RV}   DISK INFORMATION   {RO}";
•230 PRINT"{RV}NAME:{CY}"P$(0)"{BL
} ";
•235 PRINT"{RV}ID:{CY}"TY$(0)"{BL}
  # ENTRIES:     ";
•240 PRINT"{RV}BLOCKS FREE:
   ";
•250 PRINT"{RV}BLOCKS USED:
   ";
•255 PRINT"{BL}{RV}
JW>3/84{CY}{RO}"
•260 PRINT"{HM}{CY}{RV}READING ENT
RY:       {RO}":K=K+1:GOTO125
•300 REM<**READ LOAD ADDRESS
•305 CLOSE1:GOSUB2085:GOSUB2075:K=
K-1:BF=664-BU:PK$=RIGHT$(SG$+STR$
(K),3)
•310 FR$=RIGHT$(SG$+STR$(BF),3):US
$=RIGHT$(SG$+STR$(BU),3)
•315 PRINT"{HM}{CY}{RV}READING FIL
ES:       {RO}{CD}{CD}":PRINT
•320 PRINTSPC(62)"{RV}"PK$SPC(14)U
S$SPC(19)FR$
•325 FORI=1TOK:F$=P$(I)
•330 OPEN1,8,3,"0:"+F$:PRINT"{HM}{
CY}{RV}"TAB(15)I"{RO}"
•335 GET #1,LB$,HB$
•340 IFHB$=""THENH=0:GOTO350
•345 H=ASC(HB$)
•350 H=H*256
•355 IFLB$=""THENL=0:GOTO365
•360 L=ASC(LB$)
•365 LA$(I)=RIGHT$(SG$+STR$(H+L),5
)
•370 CLOSE1:NEXT
•375 GOSUB2085
•380 PRINT"{HM}{CY}{RV}END OF DIRE
CTORY{RO}       "
•385 CLOSE15
•400 REM<**PRINT DIRECTORY
•405 I=1:I$=CHR$(32)+STR$(I)+CHR$(
46):LP=6:KOUNT=9
•410 PRINT"{HM}{CY}{RV}PRINTER OPE
N{RO}     "
•415 OPEN3,4,3:CMD3:OPEN5,3,5
•420 PRINT#5,"{HM}{CY}{RV}PRINTING
 DIRECTORY{RO}     "
•425 PRINT#3,CHR$(14)SPC(9)"* {RV}
"P$(0)"{RO} *"CHR$(15)R$
•430 PRINT#3,T$"15{RV}# ENTRIES:{R
O}"T$"28"PK$T$"45"US$" {RV}BLOCKS
 USED{RO}"R$
•435 PRINT#3,T$"15{RV}DISK ID:{RO}
"T$"29"TY$(0)T$"45"FR$" {RV}BL
OCKS FREE{RO}"R$
•440 PRINT#3,T$"12NO"T$"20NAME"T$"
40BLOCKS"T$"50BYTES"T$"60L.ADD"T$
"71TYPE"
•445 PRINT#3,DD$DD$
•450 PRINT#3,T$"11"I$T$"20"P$(I)T$
"41"BK$(I)T$"50"BY$(I)T$"60"LA$(I
)T$"72"TY$(I)
•455 KOUNT=KOUNT+1
•460 IFI=KTHENPRINT#3,DD$DD$:KOUNT
=KOUNT+1:GOSUB2045:GOTO490
•465 IFI=LPTHENGOSUB2035:LP=LP+6:K
OUNT=KOUNT+1
•470 IFI=36THENGOSUB2065:PRINT#3,T
$"10{RV}PAGE 2{RO} "P$(0):GOSUB20
35:GOTO485
•475 IFI=90THENGOSUB2040:PRINT#3,T
$"10{RV}PAGE 3{RO} "P$(0):GOSUB20
35:GOTO485
•480 IFI=144THENPRINT#3,DD$DD$:GOS
UB2040:GOTO490
•485 I=I+1:I$=RIGHT$(SG$+STR$(I)+C
HR$(46),4):GOTO450
•490 CLOSE3:CLOSE5
•500 REM<**ANOTHER/END PROGRAM
•505 PRINT"{HM}{RV}ANOTHER DISK? Y
/N{RO} ":POKE36878,15
•510 GETZ$:POKE36875,200:FORM=1TO5
00:POKE36875,0
•515 POKE36876,200:FORM=1TO500:NEX
T:POKE36876,0:IFZ$=""THEN510
•520 IFZ$="N"THENPRINT"{CD}{CD}{CD
}{CD}{CD}":END
•525 IFZ$="Y"THENPRINT"{SC}":CLR:G
OTO10
•530 GOTO510
•2000 REM<**VARIABLES
•2005 DIMP$(145),BK$(145),TY$(145)
,BY$(145),LA$(145)
•2010 SG$="     ":T$=CHR$(16):R$=CH
R$(13)
•2015 DD$="......................
.................."
•2020 DL$="************************
****************"
•2025 RETURN
•2030 REM<**PRINTER SUBROUTINES
•2035 PRINT#3,DL$DL$:RETURN
•2040 PRINT#3:KOUNT=KOUNT+4:RETURN
•2045 IFKOUNT<66THENRP=66-KOUNT:GO
TO2060
•2050 IFKOUNT<132THENRP=132-KOUNT:
```

IMPORTANT
Before typing in an *Ahoy!* program, refer to the first two pages of the program listings section.

```
GOTO2060
2055 IFKOUNT<198THENRP=198-KOUNT
2060 FORI=1TORP:PRINT#3:NEXT:RETU
RN
2065 PRINT#3,R$R$R$R$R$R$R$R$R$R$
R$R$R$R$:KOUNT=KOUNT+14:RETURN
2070 REM<**DISK SUBROUTINES
2075 INPUT#15,EN,EM$,ET,ES:IFEN=0
THENRETURN
2080 PRINT"{HM}{BL}{RV}DISK ERROR
{RO}{CY}        ":PRINTEN"{RV}"EM$"
{RO}"ET;ES:END
2085 PRINT#15,"I":RETURN
2090 REM<**PRINTING COMMENTS: TO
PRINT A DISK WITH >85PGMS
2095 REM REMOVE 3 CARRIAGE RETURN
S (R$) FROM LINE 2065
```

BUG REPELLENT LINE CODES FOR DIRECTORY ASSI$TANCE (VIC 20)

```
LINE # 1:IG        LINE # 225:KM      LINE # 440:AJ      LINE # 2010:CO
LINE # 2:DC        LINE # 230:JE      LINE # 445:FN      LINE # 2015:KK
LINE # 3:AB        LINE # 235:OI      LINE # 450:BD      LINE # 2020:KM
LINE # 4:FP        LINE # 240:DC      LINE # 455:IB      LINE # 2025:IM
LINE # 5:GF        LINE # 250:FL      LINE # 460:LF      LINE # 2030:HM
LINE # 10:FH       LINE # 255:AL      LINE # 465:AB      LINE # 2035:DA
LINE # 15:DD       LINE # 260:CC      LINE # 470:BH      LINE # 2040:ID
LINE # 20:LA       LINE # 300:IK      LINE # 475:HB      LINE # 2045:DO
LINE # 100:LH      LINE # 305:LD      LINE # 480:BF      LINE # 2050:KP
LINE # 105:KK      LINE # 310:LN      LINE # 485:MG      LINE # 2055:IH
LINE # 110:GF      LINE # 315:MP      LINE # 490:OO      LINE # 2060:JM
LINE # 115:DI      LINE # 320:IF      LINE # 500:EM      LINE # 2065:MJ
LINE # 120:KN      LINE # 325:PD      LINE # 505:BK      LINE # 2070:JC
LINE # 125:KN      LINE # 330:IH      LINE # 510:IL      LINE # 2075:BC
LINE # 130:KN      LINE # 335:IH      LINE # 515:MI      LINE # 2080:MC
LINE # 135:CM      LINE # 340:IK      LINE # 520:KB      LINE # 2085:IN
LINE # 140:BG      LINE # 345:LK      LINE # 525:EB      LINE # 2090:HD
LINE # 145:EH      LINE # 350:HA      LINE # 530:CG      LINE # 2095:NA
LINE # 150:LD      LINE # 355:HG      LINE # 2000:NA     LINES: 104
LINE # 155:FN      LINE # 360:MK      LINE # 2005:KM
LINE # 160:CD      LINE # 365:EH
LINE # 165:AA      LINE # 370:IK
LINE # 170:FG      LINE # 375:GG
LINE # 175:CE      LINE # 380:GE
LINE # 180:NK      LINE # 385:AB
LINE # 185:AO      LINE # 400:FL
LINE # 190:GB      LINE # 405:NH
LINE # 195:FE      LINE # 410:EE
LINE # 200:AK      LINE # 415:HI
LINE # 205:PP      LINE # 420:AF
LINE # 210:BE      LINE # 425:BE
LINE # 215:AK      LINE # 430:FD
LINE # 220:EO      LINE # 435:MJ
```

LENGTHY MULTIPLICATION

FROM PAGE 94

```
10 REM **************************
20 REM * LENGTHY MULTIPLICATION *
30 REM **************************
34 :REM -------------------
35 :REM >> GET A$ AND B$ <<
36 :REM -------------------
40 GOSUB 200
44 :REM ------------------
45 :REM >>  INITIALIZE  <<
46 :REM ------------------
50 GOSUB 300
54 :REM -------------------------
55 :REM  FILL A(),B() FROM A$,B$
56 :REM -------------------------
60 GOSUB 400
64 :REM -------------------------
65 :REM CALCULATE D() = A() * B()
66 :REM -------------------------
70 GOSUB 500
74 :REM ---------------------
75 :REM >> DISPLAY RESULTS <<
76 :REM ---------------------
80 GOSUB 600
90 :REM *****END  OF  PROGRAM****
99 END
194 :REM ===================
195 :REM   GET A$ AND B$
```

```
•196 :REM ===================
•200 PRINT">WHAT TWO NUMBERS ARE T
 O BE MULTIPLIED"
•210 INPUT A$,B$
•290 RETURN
•294 :REM ==================
•295 :REM >>  INITIALIZE  <<
•296 :REM ==================
•300 LA=LEN(A$)
•310 LB=LEN(B$)
•320 DIM A(LA),B(LB),D(LA+LB)
•330 DEF FNU(X)=X-10*INT(X/10)
•340 DEF FNC(X)=INT(X/10)
•350 DEF FNM3(X)=ABS(X)-3*INT(ABS(
 X)/3)
•390 RETURN
•394 :REM =======================
•395 :REM  FILL A(),B() FROM A$,B$
•396 :REM =======================
•400 FOR N=1 TO LA
•410 A(N)=VAL(MID$(A$,LA-N+1,1))
•420 NEXT
•430 FOR N=1 TO LB
•440 B(N)=VAL(MID$(B$,LB-N+1,1))
•450 NEXT
•460 RETURN
•494 :REM =======================
•495 :REM CALCULATE D()= A()*B()
•496 :REM =======================
•500 FOR N=1 TO LA+LB:D(N)=0:NEXT
•510 FOR N=1 TO LB
•520 FOR M=1 TO LA
•530 MN=M+N-1
•540 T=D(MN)+A(M)*B(N)
•550 D(MN)=FNU(T)
•560 D(MN+1)=D(MN+1)+FNC(T)
•570 NEXT
•580 NEXT
•590 RETURN
•594 :REM ====================
•595 :REM >> PRINT RESULTS  <<
•596 :REM ====================
•600 K=0:IF D(LA+LB)=0 THEN K=1
•610 FOR N=LA+LB-K TO 1 STEP -1
•620 PRINT RIGHT$(STR$(D(N)),1);
•630 IF FNM3(N)=1 AND N>1 THEN PRI
 NT ",";
•640 NEXT
•650 RETURN
•900 :REM =======================
•901 :REM THE FOLLOWING ARE FROM
•902 :REM TIME MAGAZINE, 2/13/84
•903 :REM WHERE W$ * X$ * Y$ = Z$
•912 :REM ========================
•913 :REM PUT GOSUB 920 IN LINE 40
•914 :REM TO GET W$ * X$ = WX$
•915 :REM -----------------------
•916 :REM REMOVE LINE 1000 AND RUN
•917 :REM AGAIN TO GET WX$ * Y$
•918 :REM WHICH EQUALS Z$
•919 :REM -----------------------
•920 W$="1782302872140632895 11"
•930 X$="6167688219869525750 1367"
•940 Y$="1207039617824989303996968
 1"
•950 Z$="13268610439897205317760 85
 755060905614293539359890335258028
 91469459697"
•955 :REM  WX$ = W$ * X$
•960 WX$="10992688428741403060 2426
 8843530681859926 1537"
•1000 A$=W$:B$=X$:RETURN
•1010 A$=WX$:B$=Y$:RETURN
```

BUG REPELLENT LINE CODES FOR LENGTHY MULTIPLICATION

LINE # 10:OG	LINE # 290:IM
LINE # 20:PL	LINE # 294:OC
LINE # 30:OG	LINE # 295:IG
LINE # 34:EG	LINE # 296:OC
LINE # 35:BM	LINE # 300:MB
LINE # 36:EG	LINE # 310:LD
LINE # 40:CC	LINE # 320:IO
LINE # 44:AC	LINE # 330:EI
LINE # 45:IG	LINE # 340:FP
LINE # 46:AC	LINE # 350:EN
LINE # 50:CD	LINE # 390:IM
LINE # 54:FJ	LINE # 394:EL
LINE # 55:GO	LINE # 395:GO
LINE # 56:FJ	LINE # 396:EL
LINE # 60:CE	LINE # 400:OA
LINE # 64:FJ	LINE # 410:HO
LINE # 65:GK	LINE # 420:IA
LINE # 66:FJ	LINE # 430:PP
LINE # 70:CN	LINE # 440:IB
LINE # 74:JJ	LINE # 450:IA
LINE # 75:CI	LINE # 460:IM
LINE # 76:JJ	LINE # 494:EL
LINE # 80:CG	LINE # 495:GK
LINE # 90:NM	LINE # 496:EL
LINE # 99:IC	LINE # 500:NF
LINE # 194:DG	LINE # 510:PP
LINE # 195:FM	LINE # 520:OB
LINE # 196:DG	LINE # 530:IB
LINE # 200:PI	LINE # 540:IG
LINE # 210:IG	LINE # 550:IO

IMPORTANT
Before typing in an *Ahoy!* program, refer to the first two pages of the program listings section.

```
LINE # 560:PN
LINE # 570:IA
LINE # 580:IA
LINE # 590:IM
LINE # 594:FP
LINE # 595:IG
LINE # 596:FP
LINE # 600:PM
LINE # 610:KH
LINE # 620:EJ
LINE # 630:NB
LINE # 640:IA
LINE # 650:IM
LINE # 900:EL
LINE # 901:DP
LINE # 902:BG
LINE # 903:LH
LINE # 912:EL
LINE # 913:GC
LINE # 914:GG
LINE # 915:CL
LINE # 916:BG
LINE # 917:DI
LINE # 918:LO
LINE # 919:CL
LINE # 920:LP
LINE # 930:JL
LINE # 940:BK
LINE # 950:JJ
LINE # 955:BF
LINE # 960:AK
LINE # 1000:AC
LINE # 1010:LH
LINES: 93
```

LENGTHY DIVISION

FROM PAGE 94

```
10 REM //////////////////////////
20 REM /    LENGTHY DIVISION    /
30 REM //////////////////////////
34 :REM -------------------
35 :REM >> GET A$ AND B$ <<
36 :REM -------------------
40 GOSUB 200
44 :REM ------------------
45 :REM >>  INITIALIZE  <<
46 :REM ------------------
50 GOSUB 300
54 :REM -------------------------
55 :REM  FILL A(),B() FROM A$,B$
56 :REM -------------------------
60 GOSUB 400
64 :REM -------------------------
65 :REM CALCULATE Q() = A() / B()
66 :REM -------------------------
70 GOSUB 500
74 :REM ---------------------
75 :REM >> DISPLAY RESULTS <<
76 :REM ---------------------
80 GOSUB 600
90 :REM
99 END
194 :REM ===================
195 :REM   GET A$ AND B$
196 :REM ===================
200 PRINT"WHAT TWO NUMBERS ARE TO
 BE DIVIDED A/B"
210 INPUT A$,B$
290 RETURN
294 :REM ==================
295 :REM >>  INITIALIZE  <<
296 :REM ==================
300 LA=LEN(A$)
310 LB=LEN(B$)
320 DIM A(LA+1),B(LB),D(LA),Q(LA-
LB+1),T(LB)
350 DEF FNM3(X)=ABS(X)-3*INT(ABS(
X)/3)
390 RETURN
394 :REM ========================
395 :REM  FILL A(),B() FROM A$,B$
396 :REM ========================
400 FOR N=1 TO LA
410 A(N)=VAL(MID$(A$,LA-N+1,1))
420 NEXT
430 FOR N=1 TO LB
440 B(N)=VAL(MID$(B$,LB-N+1,1))
450 NEXT
460 RETURN
494 :REM ========================
495 :REM CALCULATE Q()= A()/B()
496 :REM ========================
500 FOR M=1TO LA-LB+1:Q(M)=0:NEXT
510 FOR CA=LA-LB+1 TO 1 STEP -1
520 GOSUB 700 : REM GET A()-B()
530 IF FL=-1 THEN 560
540 Q(CA)=Q(CA)+1
550 GOTO 520
560 NEXT
570 RETURN
594 :REM ====================
595 :REM >> PRINT RESULTS  <<
596 :REM ====================
600 K=0:IF Q(LA-LB+1)=0 THEN K=1
605 PRINT"QUOTIENT OF "A$"/"B$"="
610 FOR N=LA-LB-K+1 TO 1 STEP -1
620 PRINT RIGHT$(STR$(Q(N)),1);
630 IF FNM3(N)=1 AND N>1 THEN PRI
NT ",";
640 NEXT
645 PRINT:PRINT"REMAINDER ="
650 K=0:IF A(LB)=0 THEN K=1
660 FOR N=LB-K TO 1 STEP -1
670 PRINT RIGHT$(STR$(A(N)),1);
680 IF FNM3(N)=1 AND N>1 THEN PRI
NT ",";
685 NEXT
690 RETURN
691 :REM =====================
692 :REM  GET A() - B() WITH
```

```
•693 :REM   B(1) BENEATH A(CA)
•694 :REM =====================
•695 :REM  FLAG FL=-1 ON RETURN
•696 :REM       IF A() < B()
•697 :REM    OTHERWISE A() IS
•698 :REM        UPDATED
•699 :REM =====================
•700 FL=0
•705 :REM==SAVE A() IN T()
•710 FOR J=1 TO LB:T(J)=A(CA+J-1):
 NEXT
•720 FOR K=1 TO LB
•730 IF A(CA+K-1)>=B(K) THEN 760
•735 :REM  ==BORROW==
•740 A(CA+K-1)=A(CA+K-1)+10
•750 A(CA+K)=A(CA+K)-1
•755 :REM  ==SUBTRACT==
•760 D(K)=A(CA+K-1)-B(K)
•770 NEXT K
•775 :REM=IF A() < B(), SET FL=-1
•776 :REM== AND RESTORE A()
•780 IF A(CA+LB)>=0 THEN 820
•790 FL=-1:A(CA+LB)=0
•795 :REM=== RESTORE A() ===
•800 FOR J=1 TO LB:A(CA+J-1)=T(J):
 NEXT
•810 GOTO 830
•815 :REM=SUBTRACT WAS SUCCESS
•816 :REM= REPLACE A() WITH
•817 :REM=  RESULTS. LEAVE FL=0
•820 FOR K=1 TO LB:A(CA+K-1)=D(K):
 NEXT
•830 RETURN
```

BUG REPELLENT LINE CODES FOR LENGTHY DIVISION

```
LINE # 10:CM
LINE # 20:JF
LINE # 30:CM
LINE # 34:EG
LINE # 35:BM
LINE # 36:EG
LINE # 40:CC
LINE # 44:AC
LINE # 45:IG
LINE # 46:AC
LINE # 50:CD
LINE # 54:FJ
LINE # 55:GO
LINE # 56:FJ
LINE # 60:CE
LINE # 64:FJ
LINE # 65:MC
LINE # 66:FJ
LINE # 70:CN
LINE # 74:JJ
LINE # 75:CI
LINE # 76:JJ
LINE # 80:CG
LINE # 90:ML
LINE # 99:IC
LINE # 194:DG
LINE # 195:FM
LINE # 196:DG
LINE # 200:IB
LINE # 210:IG
LINE # 290:IM
LINE # 294:OC
LINE # 295:IG
LINE # 296:OC
LINE # 300:MB
LINE # 310:LD
LINE # 320:OF
LINE # 350:EN
LINE # 390:IM
LINE # 394:EL
LINE # 395:GO
LINE # 396:EL
LINE # 400:OA
LINE # 410:HO
LINE # 420:IA
LINE # 430:PP
LINE # 440:IB
LINE # 450:IA
LINE # 460:IM
LINE # 494:EL
LINE # 495:MC
LINE # 496:EL
LINE # 500:AL
LINE # 510:KF
LINE # 520:AO
LINE # 530:BB
LINE # 540:OJ
LINE # 550:CH
LINE # 560:IA
LINE # 570:IM
LINE # 594:FP
LINE # 595:IG
LINE # 596:FP
LINE # 600:PG
LINE # 605:PA
LINE # 610:HI
LINE # 620:FI
LINE # 630:NB
LINE # 640:IA
LINE # 645:LE
LINE # 650:NK
LINE # 660:EG
LINE # 670:EI
LINE # 680:NB
LINE # 685:IA
LINE # 690:IM
LINE # 691:MO
LINE # 692:GG
LINE # 693:MC
LINE # 694:MO
LINE # 695:KO
LINE # 696:ME
LINE # 697:OC
LINE # 698:LI
LINE # 699:MO
LINE # 700:HJ
LINE # 705:EN
LINE # 710:FA
LINE # 720:OG
LINE # 730:MG
LINE # 735:JP
LINE # 740:KB
LINE # 750:OO
LINE # 755:DJ
LINE # 760:AD
LINE # 770:MP
LINE # 775:BP
LINE # 776:OE
LINE # 780:KM
LINE # 790:IJ
LINE # 795:BN
LINE # 800:DC
LINE # 810:CL
LINE # 815:KO
LINE # 816:AG
LINE # 817:OB
LINE # 820:EL
LINE # 830:IM
LINES: 108
```

TERRIBLE TWINS

FROM PAGE 47

C-64 VERSION

```
•100 REM TWINS FOR COM 64
•110 REM PROGRAM BY GEORGE TREPAL
•120 PRINT"{SC}":POKE53280,15:POKE
•53281,15
•130 MA$(1)="{BK}++++":MA$(2)="{BK
 }QQQQ"
•140 VQ=54296:WQ=54276:AQ=54277:HQ
 =54273:LQ=54272:PL=54274:PH=54275
•150 E$(1)="  {RV}{RD} {BL}{RO},{R
 V}{RD} {BL}{RO},{RV}{RD} {RO}"
```

IMPORTANT
Before typing in an *Ahoy!* program, refer to the first two pages of the program listings section.

```
160 E$(2)="  {RV}{RD} {BL}{RO};{R
V}{RD} {BL}{RO};{RV}{RD} {RO}"
170 E$(3)="  {RV}{RD} {BL}{RO}<{R
V}{RD} {BL}{RO}<{RV}{RD} {RO}"
180 E$(4)="  {RV}{RD} {BL}{RO}>{R
V}{RD} {BL}{RO}>{RV}{RD} {RO}"
190 E$(5)="  {RV}{RD} N M {RO}"
200 N$="  {RV}  S  {RO}"
210 M$(1)="  {RV}{RD} JFK {RO}"
220 M$(3)="  {RV}{RD} FFF {RO}"
230 M$(5)="  {RV}{RD}  Q  {RO}"
240 M$(4)="  {RV}{RD} U*I {RO}"
250 M$(2)="  {RV}{RD}J*F*K{RO}"
260 J$="  {RD}*{RV}     {RO}£"
270 H$="  {BK}{RV}£     *{RO}"
280 S$="  {RV}{RD}      {RO}"
290 V$="{22 SPACES}"
300 J$(5)="  {YL}*{RV}     {RO}£"
310 J$(1)="  {RV}{YL}       {RO}"
320 J$(2)=J$(1):J$(3)=J$(1):J$(4)
=J$(1)
330 B$(1)="{GN}OYYYYP":B$(2)="H
N":B$(3)="LPPPP@{BK}"
340 PRINT"{SC}{CD}{BL}       THESE
ARE THE TERRIBLE TWINS.{CD}"
350 GOSUB430
360 PRINT"{HM}{CD}{CD}{CD}{CD}"TA
B(24)"{YL}{RV}£     *{RO}"
370 PRINTTAB(10)"{BL}THIS IS HONE
Y {YL}{RV}        {BL}{RO}"
380 PRINTTAB(24)"{YL}*{RV}      {RO
}£{CD}"
390 PRINTTAB(24)B$(1)
400 PRINTTAB(10)"{BL}THIS IS A BO
X{GN} ";B$(2)
410 PRINTTAB(24)B$(3)
420 GOTO470
430 PRINTH$;:PRINTTAB(31)H$
440 PRINTS$;:PRINTTAB(31)S$:PRINT
E$(1);:PRINTTAB(31)E$(2):PRINTS$;
:PRINTTAB(31)S$
450 PRINTN$;:PRINTTAB(31)N$:PRINT
M$(4);:PRINTTAB(31)M$(4):PRINTJ$;
:PRINTTAB(31)J$
460 RETURN
470 PRINT"{BL}{CD}THEY ARE VERY U
NHAPPY BECAUSE THEY KNOW"
480 PRINT"YOU WANT TO DROP BAGS O
F HONEY ON THEM."
490 PRINT"{CD}FIVE STRINGS HOLD T
HE HONEY. TO BREAK"
500 PRINT"THEM PRESS THE SPACE BA
R WHEN THE UPPER"
510 PRINT"BOX IS THE SAME AS THE
LOWER BOX."
520 PRINT"{CD}{BL}1 IS THE SLOWES
T SKILL LEVEL AND 20 IS"
530 PRINT"THE FASTEST.  WHAT SKIL
L LEVEL DO YOU"
540 PRINT"WANT TO TRY (1-20)? INP
UT YOUR LEVEL AND";
550 PRINT"PRESS THE {BK}RETURN{BL
} KEY."
560 IFMF=0THENGOSUB1130:MF=1
570 INPUT"YOUR LEVEL IS";SL
580 IF(SL<1)OR(SL>20)THEN63999
590 SL=100-SL*5
600 PRINT"{SC}";:GOSUB950:PRINT"{
CD}{CD}{CD}{CD}{CD}{CD}{CD}":GOSU
B430
610 PRINT"{HM}{CD}{CD}{CD}{CD}{CD
}{CD}{CD}{CD}{CD}{CD}{CD}{CD}{CD}
{CD}{CD}{CD}{CD}{CD}{CD}"+M$(2);:
PRINTTAB(31)M$(2)
620 PP=55297:QQ=55328:FORJ=1TO5:P
OKEPP+J,0:POKEQQ+J,0:NEXTJ
630 MM=1025:NN=1056:FORJ=1TO5:POK
EMM+J,93:POKENN+J,93:NEXTJ
640 PRINT"{HM}{CD}{CD}{CD}{CD}"TA
B(17)B$(1);:PRINT"{HM}{CD}{CD}{CD
}{CD}{CD}"TAB(17)B$(2);
650 PRINT"{HM}{CD}{CD}{CD}{CD}{CD
}{CD}"TAB(17)B$(3);
660 PRINT"{HM}{CD}{CD}{CD}{CD}{CD
}{CD}{CD}{CD}{CD}{CD}{CD}{CD}{CD}
{CD}{CD}"TAB(17)B$(1):PRINT"{HM}{
CD}{CD}{CD}{CD}{CD}{CD}{CD}{CD}{C
D}{CD}{CD}{CD}{CD}{CD}{CD}{CD}"TA
B(17)B$(2)
670 PRINT"{HM}{CD}{CD}{CD}{CD}{CD
}{CD}{CD}{CD}{CD}{CD}{CD}{CD}{CD}
{CD}{CD}{CD}{CD}"TAB(17)B$(3)
680 GOSUB1010:IFX=1THENPRINT"{HM}
{CD}{CD}{CD}{CD}{CD}"TAB(18)MA$(1
):X1=1
690 IFX=2THENPRINT"{HM}{CD}{CD}{C
D}{CD}{CD}"TAB(18)MA$(2):X1=2
700 GOSUB1010:IFX=1THENPRINT"{HM}
{CD}{CD}{CD}{CD}{CD}{CD}{CD}{CD}{
CD}{CD}{CD}{CD}{CD}{CD}{CD}{CD}"T
AB(18)MA$(1):X2=1
710 IFX=2THENPRINT"{HM}{CD}{CD}{C
D}{CD}{CD}{CD}{CD}{CD}{CD}{CD}{CD
}{CD}{CD}{CD}{CD}{CD}"TAB(18)MA$(
2):X2=2
720 FORJ=1TOSL:GETSB$:IFSB$=" "TH
```

```
EN740
•730 NEXTJ:GOTO680
•740 IFX1=X2THENP=P+1:POKEMM+P,96:
POKENN+P,96:C=C+1:GOSUB910
•750 IFX1<>X2THENPOKEMM+P,93:POKEN
N+P,93:C=C+1:P=P-1:GOSUB1060:IFP=
-1THENP=0
•760 GOSUB1020
•770 POKE198,0
•780 IFP<5THEN680
•790 :
•800 :REM HONEY DROP
•810 PRINT"{HM}{CD}{CD}{CD}{CD}{CD
}{CD}{CD}{CD}{CD}{CD}{CD}{CD}{CD}
{CD}{CD}{CD}"E$(5);TAB(31)E$(5)
•820 PRINT"{CD}{CD}"M$(5);TAB(31)M
$(5)
•830 FORL=1TO16:F=F+1:GOSUB950:NEX
TL:F=0
•840 PRINT"{HM}{CD}{CD}{CD}{CD}{CD
}{CD}{CD}{CD}{CD}{CD}{CD}{CD}{CD}
{CD}{CD}"
•850 FL$="  {RV}{YL} {RO}{BL},{RV}
{YL} {RO}{BL};{RV}{YL} {RO}"
•860 PRINTFL$;
•870 PRINTTAB(31)FL$;
•880 GOSUB1100
•890 PRINT"{BK}{SC}{CD}{CD}{CD}{CD
}{CD}{CD}             "C;"TIMES AT L
EVEL";20-(SL/5)
•895 RESTORE:GOSUB1130
•900 PRINT"{CD}{CD}{CD}{CD}{CD}
             PLAY AGAIN?":GOSUB980
:C=0:P=0:PRINT"{SC}":GOTO520
•910 POKEVQ,15:POKEWQ,33:POKEAQ,15
•920 FORJ=200TO5STEP-5:POKEHQ,J:PO
KELQ,J:NEXT
•930 POKEWQ,0
•940 RETURN
•950 PRINT"{HM}";:FORJ=1TOF:PRINT"
 ":NEXT J:PRINTJ$(1);:PRINTTAB(31
)J$(1):PRINTJ$(2);
•960 PRINTTAB(31)J$(2):PRINTJ$(3);
:PRINTTAB(31)J$(3):PRINTJ$(4);:PR
INTTAB(31)J$(4)
•970 PRINTJ$(5);TAB(31)J$(5):RETUR
N
•980 PRINT"{CD}{RD}           PRESS
ANY KEY TO GO ON"
•990 IF PEEK(197)<>64 THENPRINT"{B
K}":POKE198,0:RETURN
•1000 GOTO 990
•1010 X=INT(RND(1)*2)+1:RETURN
•1020 GOSUB1010:PRINT"{HM}{CD}{CD}
{CD}{CD}{CD}{CD}{CD}{CD}{CD}{CD}{
CD}{CD}{CD}{CD}{CD}"
•1030 IFX1=X2THENPRINTE$(X+2);TAB(
31)E$(X+2):PRINT"{CD}{CD}"M$(X+2)
;TAB(31)M$(X+2):M=240
•1040 IFX1<>X2THENPRINTE$(X);TAB(3
1)E$(X):PRINT"{CD}{CD}"M$(X);TAB(
31)M$(X):M=130
•1050 RETURN
•1060 POKEVQ,15:POKEWQ,65:POKEAQ,1
5:POKEPL,8:POKEPL,120
•1070 FORJ=200TO5STEP-10:POKEHQ,3:
POKELQ,J:NEXT
•1080 FORJ=150TO5STEP-10:POKEHQ,10
:POKELQ,J:NEXT
•1090 POKEWQ,0:POKEPL,0:POKEPH,0:R
ETURN
•1100 POKEVQ,15:POKEWQ,65:POKEAQ,1
5:POKEPL,8:POKEPL,120
•1110 FORJ=200TO5STEP-1:POKEHQ,3:P
OKELQ,J:FORDL=1TO3:NEXT:NEXT
•1120 POKEWQ,0:POKEPL,0:POKEPH,0:R
ETURN
•1130 POKEVQ,15:POKEAQ,9:POKEAQ+1,
240:POKEAQ+8,240
•1140 READXX:READXY:READDU:POKEWQ,
33:POKEWQ+7,33:IFDU<0THEN1155
•1145 POKEHQ,XX:POKEHQ+7,XX:POKELQ
,XY:POKELQ+7,XY+10
•1150 FORDL=1TODU:NEXT:GOTO1140
•1155 POKEWQ,0:POKEWQ+7,0:RETURN
•1160 DATA17,195,65,18,209,65,21,3
1,65,23,181,65
•1161 DATA25,30,65,18,209,65,15,21
0,65,18,209,65
•1162 DATA17,195,65,18,209,65,21,3
1,65,23,181,65
•1164 DATA25,30,65,18,209,65,15,21
0,65,18,209,65
•1165 DATA17,195,65,18,209,65,21,3
1,65,23,181,65
•1166 DATA25,30,65,18,209,65,15,21
0,65,18,209,65
•1167 DATA25,30,65,18,209,65,15,21
0,65,18,209,65
•1168 DATA25,30,65,18,209,65,15,21
0,65,18,209,65
•1169 DATA17,195,65,18,209,65,21,3
1,65,23,181,65
•1170 DATA25,30,250,0,0,125,18,209
,250,0,0,125,12,143,750
•1200 DATA 0,0,-1
```

BUG REPELLENT LINE CODES FOR TERRIBLE TWINS (C-64)

```
LINE # 100:GE
LINE # 110:PN
LINE # 120:CC
LINE # 130:KL
LINE # 140:KO
LINE # 150:HE
LINE # 160:CJ
LINE # 170:HG
LINE # 180:JD
LINE # 190:BN
LINE # 200:KA
LINE # 210:LI
LINE # 220:IH
LINE # 230:CK
LINE # 240:JG
LINE # 250:AB
LINE # 260:FG
LINE # 270:PN
LINE # 280:BD
LINE # 290:CL
LINE # 300:HI
LINE # 310:OO
LINE # 320:KP
LINE # 330:OF
LINE # 340:HJ
LINE # 350:CL
LINE # 360:PH
LINE # 370:EM
LINE # 380:EK
LINE # 390:LH
LINE # 400:AP
LINE # 410:LJ
LINE # 420:CL
LINE # 430:NA
LINE # 440:DL
LINE # 450:JA
LINE # 460:IM
LINE # 470:NO
LINE # 480:NG
LINE # 490:AC
LINE # 500:PO
LINE # 510:GG
LINE # 520:ED
LINE # 530:KF
LINE # 540:KM
LINE # 550:FF
LINE # 560:KE
LINE # 570:EP
LINE # 580:LH
LINE # 590:AI
LINE # 600:AH
LINE # 610:EF
LINE # 620:OF
LINE # 630:BG
LINE # 640:KD
LINE # 650:NB
LINE # 660:NH
LINE # 670:FD
LINE # 680:MP
LINE # 690:NC
LINE # 700:DF
LINE # 710:CC
LINE # 720:JI
LINE # 730:DM
LINE # 740:NG
LINE # 750:FG
LINE # 760:FM
LINE # 770:KB
LINE # 780:AP
LINE # 790:DI
LINE # 800:II
LINE # 810:MH
LINE # 820:DH
LINE # 830:JB
LINE # 840:CG
LINE # 850:PE
LINE # 860:JA
LINE # 870:LA
LINE # 880:FH
LINE # 890:JH
LINE # 895:CH
LINE # 900:NJ
LINE # 910:CH
LINE # 920:NJ
LINE # 930:KL
LINE # 940:IM
LINE # 950:KF
LINE # 960:PH
LINE # 970:OK
LINE # 980:NB
LINE # 990:OO
LINE # 1000:DC
LINE # 1010:NL
LINE # 1020:OO
LINE # 1030:GG
LINE # 1040:EN
LINE # 1050:IM
LINE # 1060:OK
LINE # 1070:DE
LINE # 1080:DB
LINE # 1090:DG
LINE # 1100:OK
LINE # 1110:KA
LINE # 1120:DG
LINE # 1130:HI
LINE # 1140:EC
LINE # 1145:HF
LINE # 1150:JN
LINE # 1155:FI
LINE # 1160:DN
LINE # 1161:BJ
LINE # 1162:DN
LINE # 1164:BJ
LINE # 1165:DN
LINE # 1166:BJ
LINE # 1167:BJ
LINE # 1168:BJ
LINE # 1169:DN
LINE # 1170:IF
LINE # 1200:JE
LINES: 120
```

VIC 20 VERSION

```
•10 PRINT"{SC}"
•100 E$(1)="  {RV}{RD} {BL}{RO}D{R
V}{RD} {BL}{RO}D{RV}{RD} {RO}"
•101 E$(2)="  {RV}{RD} {BL}{RO}F{R
V}{RD} {BL}{RO}F{RV}{RD} {RO}"
•102 E$(3)="  {RV}{RD} {BL}{RO}C{R
V}{RD} {BL}{RO}C{RV}{RD} {RO}"
•103 E$(4)="  {RV}{RD} {BL}{RO}V{R
V}{RD} {BL}{RO}V{RV}{RD} {RO}"
•104 E$(5)="  {RV}{RD} N M {RO}"
•110 N$="  {RV}  S  {RO}"
•120 M$(1)="  {RV}{RD} JFK {RO}"
•121 M$(3)="  {RV}{RD} FFF {RO}"
•122 M$(5)="  {RV}{RD}  Q  {RO}"
•123 M$(4)="  {RV}{RD} U*I {RO}"
•124 M$(2)="  {RV}{RD}J*F*K{RO}"
•130 J$="  {RD}*{RV}     {RO}£"
•140 H$="  {BK}{RV}£     *{RO}"
•150 S$="  {RV}{RD}       {RO}"
•155 V$="       {22 SPACES}        "
•160 J$(5)="  {YL}*{RV}      {RO}£"
•161 J$(1)="  {RV}{YL}       {RO}"
•162 J$(2)=J$(1):J$(3)=J$(1):J$(4)
=J$(1)
•165 M=255:GOSUB700:M=128:GOSUB700
•200 PRINT"{CD}THESE ARE THE TERRI
BLE        TWINS.{CD}"
•205 GOSUB210:GOTO250
•210 PRINTH$;:PRINTTAB(13)H$
•220 PRINTS$;:PRINTTAB(13)S$:PRINT
E$(1);:PRINTTAB(13)E$(2):PRINTS$;
:PRINTTAB(13)S$
•230 PRINTN$;:PRINTTAB(13)N$:PRINT
M$(4);:PRINTTAB(13)M$(4):PRINTJ$;
:PRINTTAB(13)J$
•240 RETURN
•250 PRINT"{PU}{CD}THEY ARE VERY U
NHAPPY BECAUSE THEY THINK YOUWANT
 TO DROP BAGS OF"
•260 PRINT"HONEY ON THEM.":GOSUB90
0
```

```
•270 PRINT"{SC}{CD}{CD}{CD}{CD}{CD
} FIVE STRINGS HOLD THE HONEY. TO
 BREAK THEM  PRESS THE SPACE BAR"
•280 PRINT" WHEN THE UPPER BOX IS
THE SAME AS THE LOWER BOX."
•340 PRINT"{CD}{CD} WHAT SKILL LEV
EL DO   YOU WANT (1 TO 20)":INPUT
" ";SL
•350 IF(SL<1)OR(SL>20)THEN270
•360 SL=100-SL*5:B$(1)="{GN}OTTP":
B$(2)="G  M":B$(3)="L@@@{BK}"
•370 PRINT"{SC}";:GOSUB800:PRINT"{
CD}{CD}{CD}{CD}{CD}{CD}{CD}":GOSU
B210
•380 PP=38401:QQ=38414:FORJ=1TO5:P
OKEPP+J,0:POKEQQ+J,0:NEXTJ
•390 MM=7681:NN=7694:FORJ=1TO5:POK
EMM+J,93:POKENN+J,93:NEXTJ
•400 PRINT"{HM}{CD}{CD}{CD}{CD}"TA
B(9)B$(1);:PRINT"{HM}{CD}{CD}{CD}
{CD}{CD}"TAB(9)B$(2);:PRINT"{HM}{
CD}{CD}{CD}{CD}{CD}{CD}"TAB(9)B$(
3);
•410 PRINT"{HM}{CD}{CD}{CD}{CD}{CD
}{CD}{CD}{CD}{CD}{CD}{CD}{CD}{CD}
{CD}{CD}"TAB(9)B$(1):PRINT"{HM}{C
D}{CD}{CD}{CD}{CD}{CD}{CD}{CD}{CD
}{CD}{CD}{CD}{CD}{CD}{CD}{CD}"TAB
(9)B$(2)
•420 PRINT"{HM}{CD}{CD}{CD}{CD}{CD
}{CD}{CD}{CD}{CD}{CD}{CD}{CD}{CD}
{CD}{CD}{CD}{CD}"TAB(9)B$(3)
•425 POKE38520,6:POKE38521,6:POKE3
8762,6:POKE38763,6
•430 GOSUB1000:IFX=1THENPOKE7800,8
1:POKE7801,81:X1=1
•440 IFX=2THENPOKE7800,102:POKE780
1,102:X1=2
•450 GOSUB1000:IFX=1THENPOKE8042,8
1:POKE8043,81:X2=1
•460 IFX=2THENPOKE8042,102:POKE804
3,102:X2=2
•470 FORJ=1TOSL:GETSB$:IFSB$=" "TH
EN500
•480 NEXTJ:GOTO430
•500 IFX1=X2THENP=P+1:POKEMM+P,96:
POKENN+P,96:C=C+1
•520 IFX1<>X2THENPOKEMM+P,93:POKEN
N+P,93:C=C+1:P=P-1:IFP=-1THENP=0
•525 GOSUB1100
•527 POKE198,0
•530 IFP<5THEN430
```

```
•540 PRINT"{HM}{CD}{CD}{CD}{CD}{CD
}{CD}{CD}{CD}{CD}{CD}{CD}{CD}{CD}
{CD}{CD}{CD}"E$(5);TAB(13)E$(5)
•550 PRINT"{CD}{CD}"M$(5);TAB(13)M
$(5)
•560 FORM=253TO255:GOSUB700:NEXTM
•600 FORL=1TO16:F=F+1:GOSUB800:NEX
TL:F=0
•601 PRINT"{HM}{CD}{CD}{CD}{CD}{CD
}{CD}{CD}{CD}{CD}{CD}{CD}{CD}{CD}
{CD}{CD}"
•602 FL$="  {RV}{YL} {RO}{BL},{RV}
{YL} {RO}{BL};{RV}{YL} {RO}"
•603 PRINTFL$;
•605 PRINTTAB(13)FL$;
•607 FORM=130TO250STEP10:GOSUB700:
NEXTM
•610 PRINT"{BK}{SC}{CD}{CD}{CD}{CD
}{CD}{CD}"C;"TIMES AT LEVEL";20-(
SL/5)
•620 PRINT"{CD}{CD}{CD}{CD}{CD}
   PLAY AGAIN?":GOSUB900:C=0:P=0:
PRINT"{SC}":GOTO340
•700 POKE36878,15:POKE36876,M:POKE
36875,M:POKE36874,M:FORL=1TO90:NE
XTL:POKE36878,0
•710 RETURN
•800 PRINT"{HM}";:FORJ=1TOF:PRINT"
 ":NEXT J:PRINTJ$(1);:PRINTTAB(13
)J$(1):PRINTJ$(2);
•810 PRINTTAB(13)J$(2):PRINTJ$(3);
:PRINTTAB(13)J$(3):PRINTJ$(4);:PR
INTTAB(13)J$(4)
•820 PRINTJ$(5);TAB(13)J$(5):RETUR
N
•900 PRINT"{CD}{RD}PRESS ANY KEY T
O GO ON"
•910 IF PEEK(197)<>64 THENPRINT"{B
K}":POKE198,0:RETURN
•920 GOTO 910
•1000 X=INT(RND(1)*2)+1:RETURN
•1100 GOSUB1000:PRINT"{HM}{CD}{CD}
{CD}{CD}{CD}{CD}{CD}{CD}{CD}{CD}{
CD}{CD}{CD}{CD}{CD}"
•1110 IFX1=X2THENPRINTE$(X+2);TAB(
13)E$(X+2):PRINT"{CD}{CD}"M$(X+2)
;TAB(13)M$(X+2):M=240
•1120 IFX1<>X2THENPRINTE$(X);TAB(1
3)E$(X):PRINT"{CD}{CD}"M$(X);TAB(
13)M$(X):M=130
•1130 GOSUB700
•1200 RETURN
```

BUG REPELLENT LINE CODES FOR TERRIBLE TWINS (VIC 20)

```
LINE # 10:HH       LINE # 425:HN
LINE # 100:JH      LINE # 430:EE
LINE # 101:KK      LINE # 440:AI
LINE # 102:AF      LINE # 450:KB
LINE # 103:PA      LINE # 460:LN
LINE # 104:EE      LINE # 470:DO
LINE # 110:ON      LINE # 480:CD
LINE # 120:BF      LINE # 500:JC
LINE # 121:BE      LINE # 520:GD
LINE # 122:KB      LINE # 525:FH
LINE # 123:PB      LINE # 527:KB
LINE # 124:LI      LINE # 530:AA
LINE # 130:II      LINE # 540:MH
LINE # 140:CN      LINE # 550:HP
LINE # 150:CJ      LINE # 560:NB
LINE # 155:HO      LINE # 600:OP
LINE # 160:LD      LINE # 601:CG
LINE # 161:EB      LINE # 602:AJ
LINE # 162:KP      LINE # 603:JA
LINE # 165:GP      LINE # 605:LM
LINE # 200:PP      LINE # 607:PM
LINE # 205:II      LINE # 610:PH
LINE # 210:OA      LINE # 620:JI
LINE # 220:DL      LINE # 700:CB
LINE # 230:JA      LINE # 710:IM
LINE # 240:IM      LINE # 800:PE
LINE # 250:LO      LINE # 810:IP
LINE # 260:OC      LINE # 820:OK
LINE # 270:KC      LINE # 900:FJ
LINE # 280:PP      LINE # 910:KO
LINE # 340:BF      LINE # 920:CO
LINE # 350:BJ      LINE # 1000:NL
LINE # 360:KG      LINE # 1100:OL
LINE # 370:ON      LINE # 1110:KG
LINE # 380:AM      LINE # 1120:BB
LINE # 390:DG      LINE # 1130:CH
LINE # 400:ON      LINE # 1200:IM
LINE # 410:GI      LINES: 76
LINE # 420:AI
```

WORDS WORTH

FROM PAGE 97

```
• 10 DIM DC$(15,2),LN$(18),TB(15),D
$(15),C$(15),TL(6),RL(15)
• 20 GOSUB 500:GOSUB 600
• 30 GOSUB 300
• 40 GOSUB 700
• 50 FOR I=0 TO 15:D$(I)=".":NEXT
• 97 REM
• 98 REM MAIN HANDLER
• 99 REM
• 100 FOR X=1 TO NP
• 102 REM
• 103 REM CLEAR THE MESSAGE AREA AN
D PRINT THE PLAYER'S NAME AND PLA
YING LEVEL
• 104 REM
• 105 GOSUB 290:PRINT LN$(16)C$P$(X
)" "LV$(LV(X))
• 106 PRINT LN$(17)"SCRAMBLE DICE =
 PRESS KEY"
• 107 REM
• 108 REM SCRAMBLE, ROLL, AND PRINT
 THE DICE
• 109 REM
• 110 GOSUB 400
• 112 REM
• 113 REM WAIT UNTIL THE TIME'S UP
• 114 REM
• 115 GOSUB 200
• 117 REM
• 118 REM GET THE NUMBER OF WORDS
• 119 REM
• 120 GOSUB 800
• 130 NEXT
• 137 REM
• 138 REM IS A PLAYER OVER 3000?
• 139 REM
• 140 IF ED<>1 THEN 100
• 147 REM
• 148 REM CLEAR THE SCREEN AND PRIN
T THE FINAL SCORES
• 149 REM
• 150 PRINT "{SC}":FOR I=1 TO NP
• 160 PRINT P$(I)" ="SC(I)
• 170 NEXT
• 195 END
• 196 REM
• 197 REM TIMER ROUTINE
• 198 REM
• 199 REM ZERO THE TIMER
• 200 TI$="000000"
• 202 REM
• 203 REM GET THE TIME LEFT: DIVIDE
 IT INTO MINUTES AND SECONDS
• 204 REM
• 205 T=TL(X)-(VAL(RIGHT$(TI$,2))+6
0*VAL(MID$(TI$,4,1))):T1=INT(T/60
):T2=T-T1*60
• 207 REM
• 208 REM PRINT THE COUNTDOWN
• 209 REM
• 210 PRINT "{HM}"TAB(5)STR$(T1)":"
```

```
STR$(T2)"  ";
217 REM
218 REM RESCRAMBLE THE DICE?
219 REM
220 IF PEEK(197)<64 THEN GOSUB 45
0:GOSUB 420
227 REM
228 REM IS THE TIME UP?
229 REM
230 IF T<1 THEN RETURN
237 REM
238 REM IF NOT, GO BACK AND TIME
 IT AGAIN
239 REM
240 GOTO 205
287 REM
288 REM CLEAR THE BOTTOM PART OF
 THE SCREEN
289 REM
290 PRINT LN$(16)BL$,BL$,BL$,BL$,
 BL$,BL$,BL$,BL$:RETURN
296 REM
297 REM GET PLAYER INFORMATION
298 REM
299 REM SET SCREEN COLORS
300 POKE 53280,0:POKE 53281,12
301 REM FOR VIC USE: 300 POKE 368
79,192
303 REM
304 REM SET THE QUESTION AND ANSW
ER LINES
305 PRINT "{BK}{SC}":PS$="{HM}{CD
}{CD}{CD}{CD}{CD}":PT$="{HM}{CD}{
CD}{CD}{CD}{CD}{CD}"
307 REM
308 REM NUMBER OF PLAYERS
309 REM
310 PRINT PS$"HOW MANY PLAYERS? (
1-6)
313 REM
314 REM WAIT FOR A VALID ANSWER
315 A$="":PRINT PT$BL$PT$;:INPUT
 A$:IF A$="" THEN 315
316 IF ASC(A$)>54 OR ASC(A$)<49 O
R LEN(A$)>1 THEN 315
317 NP=ASC(A$)-48
318 REM
319 REM GET LEVEL AND NAME FOR EA
CH PLAYER
320 PRINT "{SC}THERE ARE 3 LEVELS
:":PRINT "  1 = EASY":PRINT "  2
= HARD"
321 PRINT "  3 = VERY HARD"
325 FOR I=1 TO NP
330 PRINT PS$"WHAT LEVEL IS PLAYE
R"STR$(I)"?"
335 PRINT PT$BL$:PRINT BL$:PRINT
BL$:PRINT BL$:PRINT PT$;:A$="":IN
PUT A$
336 IF A$="" THEN 335
337 IF ASC(A$)>51 OR ASC(A$)<49 O
R LEN(A$)>1 THEN 335
340 LV(I)=VAL(A$)-1
342 REM
343 REM GET THE NAME
344 REM
345 PRINT "PLAYER "STR$(I)"'S NAM
E?":A$="":INPUT A$
347 REM
348 REM IF NO NAME, THEN NUMBER T
HE PLAYER WITHIN < >
349 REM
350 A$=LEFT$(A$,13):IF A$="" THEN
 A$="<"+STR$(I)+">"
355 P$(I)=A$
357 REM
358 REM SET THE AMOUNT OF TIME TH
E PLAYER GETS (DEPENDING ON DIFFI
CULTY)
359 REM
360 TL(I)=90+30*(3-LV(I))
370 NEXT
377 REM
378 REM STRING TELLING EACH PLAYE
R'S LEVEL
379 REM
380 LV$(0)="(EASY)":LV$(1)="(HARD
)":LV$(2)="(VERY HARD)"
390 RETURN
396 REM
397 REM DICE HANDLER
398 REM
399 REM GO SCRAMBLE THE DICE
400 GOSUB 450:FOR I=0 TO 15
402 REM
403 REM BLANK THE DICE ON THE SCR
EEN
404 REM
405 PRINT LN$(I)TAB(TB(I))C$" ":N
EXT
407 REM
408 REM ROLL EACH DIE
409 REM
410 FOR I=0 TO 15
415 D$(I)=MID$(DC$(I,LV(X)),1+INT
(RND(9)*6),1):NEXT
```

```
•417 REM
•418 REM PRINT THE DICE
•419 REM
•420 FOR I=0 TO 15
•425 PRINT LN$(I)TAB(TB(I))C$D$(RL
 (I))
•430 NEXT I
•440 RETURN
•447 REM
•448 REM DICE SCRAMBLER
•449 REM
•450 SS$="ABCDEFGHIJKLMNOP"
•455 FOR I=1 TO 16:LS=LEN(SS$)
•457 REM
•458 REM GET A RANDOM POSITION IN
 THE STRING
•459 REM
•460 R=1+INT(LS*RND(9))
•462 REM
•463 REM PULL OUT THE CHOSEN DIE A
 ND PUT BACK WHAT'S LEFT
•464 REM
•465 LS$=LEFT$(SS$,R-1):MS$=MID$(S
 S$,R,1):RS$=RIGHT$(SS$,LS-R):SS$=
 LS$+RS$
•467 REM
•468 REM CONVERT THE CHARACTER TO
 THE DIE NUMBER
•469 REM
•470 RL(I-1)=ASC(MS$)-65
•475 NEXT:RETURN
•497 REM
•498 REM SET UP DICE VALUES
•499 REM
•500 FOR I=0 TO 2
•510 FOR J=0 TO 15
•517 REM
•518 REM READ THE VALUE FROM THE T
 ABLE OF VALUES
•519 REM
•520 READ DC$(J,I)
•530 NEXT:NEXT
•537 REM
•538 REM READ THE COLOR FOR EACH D
 IE
•539 REM
•540 READ C$:FOR I=1 TO 16
•550 C$(I-1)=MID$(C$,I,1)
•560 NEXT
•590 RETURN
•597 REM
•598 REM SET UP DICE BOXES
•599 REM
•600 BOX$="{CU}{CL}{RV}DIF{CD}{CL}
 {CL}{CL}{RO}K {RV}K{CD}{CL}{CL}{C
 L}C{RO}I{RV}V{RO}"
•607 REM
•608 REM SET UP VERTICAL BOX POSIT
 IONS
•609 REM
•610 FOR I=0 TO 3:LN$(I)="{HM}{CD}
 {CD}":NEXT
•612 FOR I=4 TO 7:LN$(I)=LN$(I-4)+
 "{CD}{CD}{CD}":NEXT
•614 FOR I=8 TO 11:LN$(I)=LN$(I-4)
 +"{CD}{CD}{CD}":NEXT
•616 FOR I=12 TO 15:LN$(I)=LN$(I-4
 )+"{CD}{CD}{CD}":NEXT
•617 REM
•618 REM AND MESSAGE POSITIONS
•619 REM
•620 LN$(16)=LN$(15)+"{CD}{CD}{CD}
 ":LN$(17)=LN$(16)+"{CD}{CD}":LN$(
 18)=LN$(17)+"{CD}"
•627 REM
•628 REM SET UP HORIZONTAL POSITIO
 NS
•629 REM
•630 FOR I=0 TO 12 STEP 4:TB(I)=4:
 NEXT
•632 FOR I=1 TO 13 STEP 4:TB(I)=7:
 NEXT
•634 FOR I=2 TO 14 STEP 4:TB(I)=10
 :NEXT
•636 FOR I=3 TO 15 STEP 4:TB(I)=13
 :NEXT
•637 REM
•638 REM BLANK LINES FOR ERASING
•639 REM
•640 FOR I=0 TO 38:BL$=BL$+" ":NEX
 T:REM VIC: 628 FOR I=0 TO 20:BL$=
 BL$+" ":NEXT
•642 REM
•643 REM CLEAR THE SCREEN AND SET
 THE PRINT COLOR
•644 REM
•645 PRINT "{SC}":C$="{BK}"
•650 RETURN
•697 REM
•698 REM PRINT BOXES
•699 REM
•700 PRINT "{SC}"
•710 FOR I=0 TO 15:PRINT LN$(I)TAB
 (TB(I))C$(I)BOX$:NEXT
•720 RETURN
•797 REM
```

```
798 REM GET THE SCORE
799 REM
800 FOR Y=3 TO 7
805 POKE 198,0
810 PRINT LN$(17)BL$LN$(17)Y"{CL}-LETTER WORDS?"
815 A$="":PRINT LN$(18)BL$LN$(18);:INPUT A$
819 IF A$="" THEN 815
820 IF ASC(A$)>54 OR ASC(A$)<48 OR LEN(A$)>1 THEN 815
825 WP(Y)=VAL(A$):SC=WP(Y)*WP(Y)*Y:SC(X)=SC(X)+SC
835 NEXT
837 REM
838 REM CALCULATE THE BONUS
839 REM
840 FOR Z=3 TO 6:A=100+150*(Z-3)
845 IF WP(Z)+WP(Z+1)=12 THEN SC(X)=SC(X)+A
850 NEXT
852 REM
853 REM IS THIS PLAYER OVER 3000?
854 REM
855 IF SC(X)>3000 THEN ED=1
860 GOSUB 290
865 PRINT LN$(16);
870 FOR Z=1 TO NP:PRINT TAB(1)P$(Z)TAB(15)SC(Z)
875 NEXT
880 PRINT:PRINT "PRESS ANY KEY"
885 IF PEEK(197)=64 THEN 885
890 RETURN
897 REM
898 REM CHILD LEVEL DICE
899 REM
900 DATA AAAAAA,EEEEEE,OOOIIU,OOIIUU,LLLHHH,SRRRTL,BDFGPT,BDFGPT
910 DATA CMNSWY,CMNSWY,AEIOUE,AEIOUO,VXKKZN,STRMDG,STRCNP,FBJLHN
917 REM
918 REM INTERMEDIATE LEVEL DICE
919 REM
920 DATA AEAEAE,EAEAEA,OOLBWY,OOCPMW,UIFHRS,UIGMRS,BITHKR,UIFPNT
930 DATA OLDRNT,EJXQVZ,JMGCDK,LPBFNH,SVWQSY,SIERTG,NIAMDB,LKCFHP
937 REM
938 REM EXPERT LEVEL DICE
939 REM
940 DATA AEAEIO,NMEAOI,EOLBWY,AOCPMW,UEFHRS,UAGMRS,BITHKR,UIFPNT
950 DATA OLDRNT,XJXQVZ,JMGCDK,LPBFNH,SVWQSY,SQZRTG,NIAMDB,LKCFHP
957 REM
958 REM BOX COLORS
959 REM
960 DATA "{BK}{WH}{RD}{CY}{PU}{GN}{BL}{YL}{OR}{BR}{LR}{G1}{YL}{LG}{LB}{G3}"
```

BUG REPELLENT LINE CODES FOR WORDS WORTH

LINE # 10:LH	LINE # 202:JD
LINE # 20:IL	LINE # 203:OB
LINE # 30:CD	LINE # 204:JD
LINE # 40:CH	LINE # 205:FK
LINE # 50:BL	LINE # 207:JD
LINE # 97:JD	LINE # 208:OK
LINE # 98:KL	LINE # 209:JD
LINE # 99:JD	LINE # 210:JA
LINE # 100:PF	LINE # 217:JD
LINE # 102:JD	LINE # 218:PL
LINE # 103:LL	LINE # 219:JD
LINE # 104:JD	LINE # 220:JD
LINE # 105:PK	LINE # 227:JD
LINE # 106:FG	LINE # 228:DJ
LINE # 107:JD	LINE # 229:JD
LINE # 108:JB	LINE # 230:PO
LINE # 109:JD	LINE # 237:JD
LINE # 110:CE	LINE # 238:PG
LINE # 112:JD	LINE # 239:JD
LINE # 113:PD	LINE # 240:CF
LINE # 114:JD	LINE # 287:JD
LINE # 115:CC	LINE # 288:NH
LINE # 117:JD	LINE # 289:JD
LINE # 118:IK	LINE # 290:AJ
LINE # 119:JD	LINE # 296:JD
LINE # 120:CI	LINE # 297:MA
LINE # 130:IA	LINE # 298:JD
LINE # 137:JD	LINE # 299:CG
LINE # 138:IK	LINE # 300:DG
LINE # 139:JD	LINE # 301:IP
LINE # 140:PL	LINE # 303:JD
LINE # 147:JD	LINE # 304:NA
LINE # 148:AH	LINE # 305:GK
LINE # 149:JD	LINE # 307:JD
LINE # 150:JO	LINE # 308:DG
LINE # 160:JO	LINE # 309:JD
LINE # 170:IA	LINE # 310:KD
LINE # 195:IC	LINE # 313:JD
LINE # 196:JD	LINE # 314:LH
LINE # 197:CM	LINE # 315:PC
LINE # 198:JD	LINE # 316:AH
LINE # 199:DP	LINE # 317:MI
LINE # 200:NI	LINE # 318:JD

IMPORTANT

Before typing in an *Ahoy!* program, refer to the first two pages of the program listings section.

```
LINE # 319:JI      LINE # 455:GF
LINE # 320:NC      LINE # 457:JD
LINE # 321:OP      LINE # 458:IA
LINE # 325:FO      LINE # 459:JD
LINE # 330:DM      LINE # 460:IH
LINE # 335:FK      LINE # 462:JD
LINE # 336:IN      LINE # 463:HD
LINE # 337:NO      LINE # 464:JD
LINE # 340:DN      LINE # 465:AL
LINE # 342:JD      LINE # 467:JD
LINE # 343:NE      LINE # 468:OG
LINE # 344:JD      LINE # 469:JD
LINE # 345:MD      LINE # 470:LJ
LINE # 347:JD      LINE # 475:EJ
LINE # 348:PA      LINE # 497:JD
LINE # 349:JD      LINE # 498:ME
LINE # 350:HA      LINE # 499:JD
LINE # 355:DK      LINE # 500:OJ
LINE # 357:JD      LINE # 510:BG
LINE # 358:LB      LINE # 517:JD
LINE # 359:JD      LINE # 518:BH
LINE # 360:ID      LINE # 519:JD
LINE # 370:IA      LINE # 520:FN
LINE # 377:JD      LINE # 530:EF
LINE # 378:OH      LINE # 537:JD
LINE # 379:JD      LINE # 538:IF
LINE # 380:FI      LINE # 539:JD
LINE # 390:IM      LINE # 540:HF
LINE # 396:JD      LINE # 550:NL
LINE # 397:PK      LINE # 560:IA
LINE # 398:JD      LINE # 590:IM
LINE # 399:PM      LINE # 597:JD
LINE # 400:HH      LINE # 598:FF
LINE # 402:JD      LINE # 599:JD
LINE # 403:OB      LINE # 600:EK
LINE # 404:JD      LINE # 607:JD
LINE # 405:HL      LINE # 608:KP
LINE # 407:JD      LINE # 609:JD
LINE # 408:AN      LINE # 610:EH
LINE # 409:JD      LINE # 612:OF
LINE # 410:BH      LINE # 614:IE
LINE # 415:PC      LINE # 616:NA
LINE # 417:JD      LINE # 617:JD
LINE # 418:IG      LINE # 618:AF
LINE # 419:JD      LINE # 619:JD
LINE # 420:BH      LINE # 620:KF
LINE # 425:HO      LINE # 627:JD
LINE # 430:ON      LINE # 628:JG
LINE # 440:IM      LINE # 629:JD
LINE # 447:JD      LINE # 630:FE
LINE # 448:JO      LINE # 632:FL
LINE # 449:JD      LINE # 634:JC
LINE # 450:MC      LINE # 636:HB
```

READER SERVICE INDEX

```
LINE # 637:JD
LINE # 638:OE
LINE # 639:JD
LINE # 640:KD
LINE # 642:JD
LINE # 643:MN
LINE # 644:JD
LINE # 645:NL
LINE # 650:IM
LINE # 697:JD
LINE # 698:NL
LINE # 699:JD
LINE # 700:JJ
LINE # 710:LD
LINE # 720:IM
LINE # 797:JD
LINE # 798:DI
LINE # 799:JD
LINE # 800:AB
LINE # 805:LD
LINE # 810:ME
LINE # 815:LO
LINE # 819:JE
LINE # 820:OJ
LINE # 825:DC
LINE # 835:IA
LINE # 837:JD
LINE # 838:LO
LINE # 839:JD
LINE # 840:CC
LINE # 845:PI
LINE # 850:IA
LINE # 852:JD
LINE # 853:BG
LINE # 854:JD
LINE # 855:JN
LINE # 860:EJ
LINE # 865:GD
LINE # 870:OJ
LINE # 875:IA
LINE # 880:GI
LINE # 855:JN
LINE # 860:EJ
LINE # 865:GD
LINE # 870:KM
LINE # 875:IA
LINE # 880:GI
LINE # 885:IL
LINE # 917:JD
LINE # 918:GP
LINE # 919:JD
LINE # 920:FL
LINE # 930:IJ
LINE # 937:JD
LINE # 938:CF
LINE # 939:JD
LINE # 940:KK
LINE # 950:BP
LINE # 957:JD
LINE # 958:EE
LINE # 959:JD
LINE # 960:EE
LINES: 254
```

FLOTSAM

How are pretty girls and a good communications program both alike? Here's the answer in ASCII: 84 72 69 89 32 66 79 84 72 32 72 65 86 69 32 65 32 80 82 69 84 84 89 32 71 79 79 68 32 66 65 85 68.

Your readers may be interested to know that there are electronic bulletin boards operating successfully with a Commodore 64. I am running one that I helped write, using the Commodore 64 and Commodore 1650 automodem. Your readers might like to call in and telecommunicate sometime. Since I'm using my home phone, I'm currently operating only from 9 p.m. to midnight on Friday, Saturday, and Sunday (central time).

Features of the board include download capacity and remotely written menu file capability. Commodore owners and others may wish to check in and look around; or page me and I'll be happy to chat. (Set your modem to 300 baud, full duplex, 8 bit word length with 1 stop bit, no parity, and modem set to originate. Number is 601-327-5062.)

Keep up with the good work your magazine is doing.

—Dave Barron
Columbus, MS 39702

P.S.: The answer to the above question is: "They both have a pretty good baud."

The author of the above letter is not the Dave Barron who contributes regularly to Ahoy! *After that joke, we're sure our Dave would want that pointed out.*

This last March my children bought me a C-64 with a datacassette and a 13" color TV, to keep me out of trouble. Last week a neighbor gave me a copy of *Ahoy!* (March '84). It is a very good magazine. Games are okay, but my interest is in making the machine do what I want it to do. Which brings me to the point.

On page 83 of that issue there is a printout of B.W. Behling's *Address Book,* which is great, but I can't count the spaces in lines 1534 to 1544. This seems to be a weakness in *Ahoy!* I could bypass those lines, but I don't wish to.

As yet, I am not a subscriber to *Ahoy!* Next month is my seventy-first birthday and I am trying to con my children into a disk drive (and a printer for Christmas). So, meanwhile, I am saving the best I can. I will pedal my tricycle (really!) to the newsstand and look to buy *Ahoy!*

—Frank R. Whitman
Brooklyn, NY

P.S. I am able to pay a modest fee for Mr. Behling's *Address Book.* Is this possible? My fingers are crooked and it's hard for me to type.

Frank, we enjoyed your letter so much that we decided to send you a complimentary copy of Address Book. *As for those spaces, they can be determined by lining up a straight edge with the characters above and below the line in question. From now on, we will be indicating line spacing in program runs.*

MANUFACTURERS LISTING *Continued from page 28*

Janewrite
Arktronics
520 East Liberty
Ann Arbor, MI 48104
(313)769-7253
Disk, cartridge

Joe's Writer
Creative Software
230 East Caribbean Drive
Sunnyvale, CA 94089
$49.95

Letter Wizard
Datasoft, Inc.
9421 Winnetka Avenue
Chatsworth, CA 91311
(213)701-5161
$49.95 disk

Magic Desk
Commodore Business Machines
1200 Wilson Drive
West Chester, PA 19380
(215)431-9100
$69.95 cartridge

Maxi-Pros
Aardvark Action Software
2352 South Commerce
Walled Lake, MI 48088
(313)669-3110
(800)624-4327
$24.95 disk or tape

Micro-Writer
MicroTechniques
P.O. Box 192
Chesterfield, MO 63017

Omniwriter
HesWare
150 North Hill Drive
Brisbane, CA 94005
(415)468-4111
$69.95 disk

Page-Mate
A B Computers
252 Bethlehem Pike
Colmar, PA 18915
$40.00 disk or tape

Paper Clip
Batteries Included
186 Queen Street West
Toronto, Ontario, Canada
M5V 1Z1
(416)596-1405
$99.95 disk or tape

Quick Brown Fox
Quick Brown Fox
548 Broadway, Suite 4F
New York, NY 10012
(212)925-8290
$65.00 cartridge

Quickwriter III
Educomp
2139 Newcastle Avenue
Cardiff, CA 92007
(619)942-3838
$19.95 disk or tape

Script 64
Pacific Coast Software
7334 Hollister Avenue
Santa Barbara, CA 93117
(805)685-8282 or 685-1131
$99.95 disk

Script 64
Richvale Communications Ltd.
10610 Bayview Avenue
Richmond Hill, Ontario,
Canada L4C 3N8
(416)884-4165
$65.00 tape, $99.00 disk

Script Ease
Midwest Software
Farmington, MI 48024
(313)477-0897
$39.50 disk or tape

Scriptimus
Trimicro
1010 North Batavia, Suite G
Orange, CA 92667
(714)771-4038
$39.95 disk or tape

SM-Text 64
SM Software, Inc.
252 Bethlehem Pike
Colmar, PA 18915
(215)822-9627
(215)682-9657 support
$75.00 disk

Smithwriter
Softsmith Corporation
2935 Whipple Road
Union City, CA 94587
(415)487-5900
(800)341-4000
$59.95 disk

Soft-Writer
Raymac Software Group
Boulder Creek, CA 95006
(408)338-9848
$24.95

SuperText
Muse Software
347 North Charles Street
Baltimore, MD 21201
(301)659-7212
$99.00 disk

Textmaster
Advantage Computer Accessories, Inc.
1020 Meyerside Dr., Units 7&8
Mississauga, Ontario, Canada
L5T 1K7
(416)676-1200
$39.95 disk and tape (in one package)

Textwriter
O.E.M., Inc.
3802 Oleander Avenue
Ft. Pierce, FL 33450

Totl Text 2.6
Totl Software, Inc.
1555 Third Avenue
Walnut Creek, CA 94596
(415)943-7877
$40.00 tape, $44.00 disk

Word Commander 64
MMG Micro Software
P.O. Box 131
Marlboro, NJ 07746
(201)431-3472
$49.95 disk or tape

Wordcraft 40
Audiogenic, Ltd.
34-36 Crown Street
Reading, Berkshire
England RG1 25H
U.S. Agent:
Regenics, Inc.
P.O. Box 767
Orange, CA 92666
(714)639-9396
$124.95 cartridge

Word Machine/Name Machine
Commodore Business Machines
1200 Wilson Drive
West Chester, PA 19380
(215)431-9100
$19.95 disk

WordManager
Data 20 Corp.
23011 Moulton Pkwy., Ste. B10
Laguna Hills, CA 92653
(714)770-2366

Disk or tape; free with purchase of 80-column board

Wordpro 3 Plus/64
Professional Software, Inc.
51 Fremont Street
Needham, MA 02194
(617)444-5224
$99.95 disk

Word Processor, Professional Version
Mirage Concepts, Inc.
2519 West Shaw Ave. #106
Fresno, CA 93711
(209)227-8369
(800)641-1441
$89.95 disk

The Word Processor
Pacific Coast Software
7334 Hollister Avenue
Santa Barbara, CA 93117
(805)685-8282 or 685-1131
$99.95 disk

WordProcessor 64
Pro-Line Software Ltd.
755 The Queensway East,
Unit 8
Mississauga, Ontario, Canada
L4Y 1B4
(416)273-6350
$49.95 disk

Wordsmith 64
Softsmith Corporation
2935 Whipple Road
Union City, CA 94587
(415)487-5900
$69.95 disk or tape

Word Writer
Timeworks, Inc.
405 Lake Cook Road
Deerfield, IL 60015
(312)291-9200

Write Now!
Cardco, Inc.
313 Matheson
Wichita, KS 67214
(316)267-6525
$49.95 cartridge

The Writer's Assistant
Rainbow Computer Corp.
490 Lancaster Pike
Frazer, PA 19355
(215)296-3582
$29.95 disk

RUPERT REPORT

Continued from page 38

program divides two integers of any length and gives the quotient and the remainder. The earlier program is limited to integers with fewer than ten digits, but the decimal equivalent of the remainder is evaluated to any length desired.

We won't spend much time discussing this program. It has comments which should help if you are interested in its workings. Basically, it repeatedly subtracts B( ) from the leading digits of A( ) and increments the quotient with each successful subtraction. When B( ) can no longer be subtracted from the first part of A( ), it is shifted right and subtracted from the next portion of A( ). The variable CA represents the column of A( ) under which the least significant digit (LSD) of B( ) is placed for subtraction. Once the LSD of B( ) has been shifted under the LSD of A( ) and subtracted as many times as possible, Q( ) contains the digits of the quotient, and the remainder is left in A( ). These results are printed by the routine at line 600.

With this program, you should be able to divide Z$ by Y$ and divide that result by X$ to end up with W$ from the previous program. Using lines 920 through 950 from *Lengthy Multiplication,* you should be able to add statements such as A$=Z$: B$=Y$ and run the program to get a result, say ZY$. Then use statements to let A$ equal that result and let B$ equal X$ given in line 930. After running the program one more time, the result should be W$ given in line 920 of *Lengthy Multiplication.*

Where do you go from here? You might develop your own programs which take better advantage of the Commodore's precision. It can obviously get exact results for more than a one by one digit multiplication. Also the division algorithm is far from optimal. How about a factorial program—one that will calculate the exact value of 100 factorial for example? Or how about a program to calculate the exact value of 2 raised to the 251st power?

If you are interested in learning more about some of the topics discussed here, you might look up articles in the January 1982 and December 1982 issues of *Scientific American* magazine. There are interesting and reasonably up-to-date facts on the search for prime numbers and on supercomputers. Articles on number theory in encyclopedias are also a good source of information as to what things are known and what things are still to be discovered or proved in mathematics.

Your microcomputer is a powerful tool for investigating numbers and their properties. It can be fun just to verify the results postulated by others. Remember to feed your computer some long numbers every now and then just to keep it happy!

SEE PROGRAM LISTINGS ON PAGE 79

Creating Your Own Games

Continued from page 18

key and the dice will be scrambled—that is, the same letters will be on the screen, but they'll be in different boxes. This can help you see letter combinations that you might otherwise overlook.

You play by writing down (or calling out for other players to write down) the words that you can make out of the letters on the dice. You can use the letters in any order, but you can only use each die once in the same word.

You can make up to six three-letter words, six four-letter words, and so on. Words with seven or more letters are counted as seven-letter words. There is a bonus for getting all six words in each word-length, and an extra bonus for getting all six words in two adjacent word-lengths. For instance, if you get six four-letter words and six five-letter words, you get an extra bonus.

When your time is up, the program asks you how many words of each length you got. (Enter 0 if you didn't get any.) Then it calculates your score, displays all the players' scores, and waits for a keypress. When you press a key, the next player's dice are rolled and displayed.

When one player gets more than 3000 points, the game ends.

Simple enough. But you'll notice that this doesn't get us away from pencil and paper—you still have to write things down. I could have allowed you to enter the words right at the computer, but that would give an unfair advantage to touch typists. Also, the logic necessary to check your word to make sure you could make it out of the letters on the dice would have added considerably to the length of the program. This is a demonstration—I wanted you to be able to type it in in less than an hour!

Notice the dice-rolling routine at lines 400-440. Line 415 does exactly what the short sample program did. It looks more complex because instead of a single die, DC$, the same line is used to roll each of sixteen dice, which can come out of one of three different sets of dice. This gives us a very complex string in the MID$ function: MID$(DC$(I,LV(X)), 1+INT(RND(9)*6),1).

The variable DC$, therefore, is a two-dimensional array. The variable I is the counter—it decides which of the sixteen dice we're rolling. And the variable LV(X) tells which *set* of dice to roll, depending on the level (LV) of the player whose turn it is (X). It looks complicated, but that's what allows six different players to each use one of three sets of dice, and to roll all sixteen dice using the same program line.

DRAWING TILES AND SHRINKING LISTS

The *Words Worth* game also demonstrates another use of string functions in letter games. The routine at lines 450-475 scrambles the dice to change the order in which they're displayed.

To explain what's going on in those lines, let's digress for a moment to talk about a completely different game, *Scrabble.* In *Scrabble,* instead of dice, you start out with a set of tiles, each of which contains only one letter. Once a tile has been played on the board, it can never be used again. This means that each time you draw a tile, you are drawing from a steadily decreasing group of tiles, until finally the tiles run out.

It's like a grocery list. You start out with a certain number of items to pick up. You can get them in any order, but you want to get each one only once. So you strike out each item as you pick it up. The list shrinks until, when it's exhausted, you know your job is done.

This is quite different from dice, which can used over and over again. Now we not only have to randomly choose a letter, we have to remove it from the list of possible letters so it can never be chosen again.

This little sample program will do exactly that. We'll use a simple set of tiles—the alphabet, with each letter occurring only once:

```
10 SS$="ABCDEFGHIJKLMNOPQRSTUVWXY
Z"
```

Now, we can use RND and MID$ to select a letter, just as we did before. However, since this string will be shrinking each time we remove a letter, we can't just choose a random number between 1 and 26. Fortunately, BASIC provides the LEN function. LEN(SS$) will tell us the length of string SS$, so that as the set of tiles shrinks, we can get a random number in the right range:

```
0 LS=LEN(SS$)
0 R=1+INT(LS*RND(9))
0 L$=MID$(SS$,R,1)
```

Now we have to remove letter L$ from SS$. To do this we'll use the LEFT$ and RIGHT$ functions. These are very much like MID$, except that LEFT$ takes all the characters from the left side of the string until the stopping place, and RIGHT$ takes from the right side of the string.

```
50 LS$=LEFT$(SS$,R-1):RS$=RIGHT$(
SS$,LS-R):SS$=LS$+RS$
```

The variable LS$ is set to include all the letters from the left edge until the position one less than where the letter we chose was located (R-1). The variable RS$ is set to include all the letters from the right edge until just after the letter we chose. We figure how many that is by subtracting the position of the letter we chose from the length of the string (LS–R).

Then, we set SS$ to LS$+RS$. All the letters are in their proper places—except the one we chose, which was not included in either LS$ or RS$. Next time, SS$ will be shorter by one character.

Let's put this all together into one brief sample program:

```
10 SS$="ABCDEFGHIJKLMNOPQRSTUVWXY
Z"
20 LS=LEN(SS$)
30 R=1+INT(LS*RND(9))
40 L$=MID$(SS$,R,1)
50 LS$=LEFT$(SS$,R-1):RS$=RIGHT$(
SS$,LS-R):SS$=LS$+RS$
60 PRINT CHR$(19)LS$" "L$" "RS$"
"
65 FOR I=0 TO 19:NEXT:PRINT LS
70 FOR I=0 TO 19:NEXT:PRINT LS
80 IF SS$="" THEN END
90 IF PEEK(197)=64 THEN 90
100 GOTO 20
```

Each time you press a key, you'll see the program select a letter; the next time it selects a letter, the one you chose the time before will be gone. Also, the number of letters in the string will be displayed.

In *Words Worth*, I use this technique, but instead of drawing tiles, I'm scrambling the order of the dice. This is a tricky job, since I want to make sure each die gets moved to a random position, but no die gets overlooked, and only one die gets assigned to each position.

The solution was to create a string of sixteen let-

ters, in order: SS$="ABCDEFGHIJKLMNOP". I used exactly the same system as in the sample program above, but instead of keeping the *letter* I pulled out of the string, I used the *ASCII value* of the letter. The ASC function converts any character into its numeric value. The letters A through P are the numbers 65 through 80. By subtracting 65 from the value of each letter, I get a number from 0 to 15. Each letter was randomly chosen, so the numbers will not be in any particular order. However, each number will occur once and only once! You'll probably find this system as useful as I have; quite a few programs need a shrinking list.

COUNTING DOWN WITH TI$

Most of the rest of the program is either self-explanatory or you'll have to take it on faith—except the timer routine that starts at line 200.

Commodore BASIC has a built-in timer that you can use whenever you need it. It is contained in the variable TI$, which returns, not a number, but a six-character string consisting of numbers.

To use TI$, first set it to zero:

```
10 TI$="000000"
```

TI$ immediately starts counting upward, adding 1 to its value approximately every second (variations in electrical current can cause tiny variations in the computer's internal clock). So any time after you set it to zero, you can find out how long it has been since you set it:

```
10 TI$="000000"
20 PRINT CHR$(19)TI$:GOTO 20
```

You can cut it into hours, minutes, and seconds quite easily:

```
10 TI$="075945"
20 PRINT CHR$(19)LEFT$(TI$,2)":"M
ID$(TI$,3,2)":"RIGHT$(TI$,2):GOTO
 20
```

Notice that I started the timer with a time other than 0. This is because otherwise you'd have to wait an hour to see the hours change. I'm too impatient.

Often, though, you won't want to count forward—you'll want a countdown to 0. Let's say you have a game in which you want to start with a 3000-point bonus. Every five seconds, the bonus decreases by 100 points. That means that in 150 seconds (two and a half minutes) the bonus is down to zero.

This program will cut TI$ into minutes and seconds, convert the minutes into seconds, figure the bonus, and count down.

```
10 TI$="000000":FF=150
20 M=VAL(MID$(TI$,4,1)):S=VAL(RIG
HT$(TI$,2)):T=S+60*M
30 TL=FF-T
40 IF (TL/5)=INT(TL/5) THEN PRINT
 CHR$(19)STR$(TL*20)
50 IF TL>0 THEN 20
```

Line 20 gets the number of minutes (M) and seconds (S), multiplies the minutes by 60, and adds them together. Then line 30 subtracts the number of seconds from the final figure (FF) to get the time left (TL).

Notice the function VAL. If a string is completely numeric—that is, if every character is a digit between 0 and 9—then VAL returns, not the ASCII value of the characters, but the number they spell out. If you PRINT VAL("3"), you'll get the number 3. If you PRINT ASC("3"), you'll get the number 51. And if you PRINT VAL("A"), then you'll get an error, because while *A* has an ASCII value, it has no numeric value.

In line 40, the program checks to see if TL is evenly divisible by 5. If it is, then TL/5 will be the same as INT(TL/5)—in other words, you can divide TL by 5 without a remainder. If TL is a multiple of 5, then we print the bonus, which is TL times 20.

This is a pretty slow countdown—often you'll use countdowns that change every second. It certainly adds to the sense of urgency in the game to watch time getting ticked off, not by the second, but by hundreds of points each second.

IS THIS ALL YOU CAN DO?

By no means. Using the string operations we've gone through here (MID$, RIGHT$, LEFT$, ASC, VAL, and LEN), you can put together many different games—much more sophisticated than the *Words Worth* game I've included here.

The same techniques are used in many games, not just letter games. Next month we'll use them extensively in creating a text adventure game. Text adventures are the marvelous storytelling games like *Zork*, in which the computer takes you through fantastic scenery to meet strange creatures and have marvelous adventures.

Alas, I won't provide you with a program even a tenth as good as *Zork*—but the mini-adventure we'll program together will at least show you the princi-

ples of adventure game programming. Then it's up to you to develop really creative, exciting adventures for other gamers to play.

And I'll admit that I am inordinately fond of good text adventures. I've made my living by writing fantasy for a good many years, and good text adventures are the closest melding of game and fiction that I've yet seen. When it comes to computer games, a word can sometimes be worth a thousand pictures. □

SEE PROGRAM LISTING ON PAGE 87

EDUCATIONAL SOFTWARE

Continued from page 66

ity time with you. This is one of the more expensive purchases you will make for your child; money does not equal importance. Your time, paling around, serving as a role model, is at least as important—and it's free. Be wary of demanding that the computer be important to your child because it cost you a lot.

When you introduce a computer into your child's life, make yourself a part of that new activity. You can learn enough to stay involved even as he becomes a programming whiz. As adults, we ought to be self-assured enough to enjoy watching our children learn, even when they outstrip us. If you are already into computers, remember to share your child's excitement as he explores all those things that seem so elementary to you. (And to share the computer if you both use it.) □

Programs for Commdore 64 computers mentioned in this article:

Alphabet Construction Set
Futurehouse
Box 3470
Chapel Hill, NC 27514
(800) 334-SOFT
$29.95 disk (requires a $34.95 light pen)

Coqito
Readers Digest Services, Inc.
Pleasantville, NY 10570
(800) 431-8800
$39.95 disk

Frenzy/Flip Flop
Edufun-Milliken Publishing Company
1100 Research Blvd.
P.O. Box 21579
St. Louis, MO 63132-0579
$39.95 cartridge; for ages 2 to 6.

Gulp!!/Arrow Graphics
Edufun
$39.95 cartridge; for ages 2 to 6.

Juggles' Rainbow
The Learning Company
545 Middlefield Road
Menlo Park, CA 94025
(415) 328-5410
$29.95; for ages 3 to 6.

MathWiz
Merritt Software, Inc.
P.O. Box 1504
Fayetteville, AR 72702
(501) 442-0914
$100.00 disk; for grades 5 to 8.

Missing Links
Sunburst Communications
Room YR 8 5
39 Washington Avenue
Pleasantville, NY 10570
(800) 431-1934
$49.00 disk (with backup); for grades 3 and up.
(Three versions are available: Young People's Literature, Micro-Encyclopedia, and Classics.)
Also available from:
Human Engineered Software
150 N. Hill Drive
Brisbane, CA 94005
(800) 227-6703

MusiCalc
Waveform Corporation
1912 Bonita Way
Berkeley, CA 94704
(415) 841-9866
$74.95 disk
(Additional products available are: Scorewriter and Keyboard Maker, $34.95 each; African/Latin Rhythms and New Wave/Rock, $24.95 each.)

Music Construction Set
Electronic Arts
2755 Campus Drive
San Mateo, CA 94403
(415) 571-7171
$40.00 disk

Race Car 'Rithmetic
Unicorn Software
Liberace Plaza, Suite 8
1775 East Tropicana Avenue
Las Vegas, NE 89109
(702) 798-2727
$39.95 disk; for ages 5 and up.

Speedy Spides
Readers Digest
$34.95 disk; for ages 9 and up.

COMMODARES

Continued from page 62

situation!

People who have sent workable solutions to March and April *Commodares* include: Mark Nekic (Eastlake, OH), Haley Carter Jr. (Dayton, OH), Joseph Carpino (Lyndhurst, NJ), John F. Adams (St. Charles, IL), John Chong, age 13 (Syracuse, NY), S. Schermerhorn (Wellesley Hills, MA), Richard Lovett (Kansas City, MO), Harold Ingram (Jackson, MS), Jerry Fitch (Mt. Juliet, TN), Steve Godwin (Miami, FL), Jon Dudding (Midlothian, VA), Frank L. Huff (Huber Heights, OH), Walter Dickerson (Brick, NJ), Jeff Randall (Carleton, MI), Tom Bender (Danbury, CT), Dennis DeFendi (Bethesda, MD), Donald Rogers (Naperville, IL), Alan Bowen (Franklin, TN), Frank Nasuti (Norwood, MA), Jon Syverston (Richland Center, WI), Christopher Hebert (Sunnyvale, CA), Betty Colgin (Paxton, NE), John Talipsky (Norcross, GA), Bill Lloyd (St. Paul, MN), Gary R. Forney (Delwein, IA), David McDonald (Richland, WA), Bill McGrail (Marblehead, MA), James C. Dunavant (Gainesville, FL), Jim Cunningham (Collinsville, OK), Sheldon Wotring (Palmerton, PA), Hal Sigler (Brooklyn, NY), Rick Miller (Laramie, WY), Michael Franklin (Atchison, KS), Randy Barr (Liverpool, WV), J.L. Tyler (Rochester, IN), W.T. Mallison (Rocky Mount, NC), and John Kubiac (Sterling Hgts., MI).

These names are in a precisely-chosen random order. Next month we'll look at some of the ideas and suggestions their letters have included. Till then, keep that keyboard humming. □

EDITORIAL

Continued from page 5

Funny things happen. When I departed my first home in Wisconsin, back at the end of 1937, I left behind a lot of science fiction magazines which I had accumulated monthly at a price of 20 or 25 cents per copy. I suppose that they were eventually all thrown away—sadly, because they are now collectors' items, some of them valued at 30, 50, and up to over 100 *dollars* apiece! Maybe one reason for this is that they contain the originals of stories giving at least hints of just about every remarkable reality that has since come about, and those of the imaginable future: spacecraft, robots that think, mind-enhancers, interstellar communication and journeys, rejuvenation, contact with alien beings and biologies, utopias and hells, marvels galore!. . .

No, I don't urge the hoarding of present-day publications and artifacts, in the hope that somebody might sometime enjoy wealth from an unexpected source; the mass effort would be self-defeating through oversupply. I only suggest further that obsolescence is less of a hazard than some suppose, and that outcomes are not entirely predictable.

The gaming spirit was strong in mankind eons before there were sophisticated videogames. How old is chess or checkers? Or card-playing? And in the Metropolitan Museum of Art of N.Y.C. there is a carven ivory game board that looks rather like a tiny grand piano. No rule book for it is known, and its only name was suggested by the canine-headed marker-pins, evidently meant to be moved from peg-hole to peg-hole: *Hounds and Jackals.* It is from Egypt, 4,000 years ago.

I'm no advocate of gambling. But some risk is an inevitable part of the game of being alive. With all that challenges us now and further ahead, aren't we eager and sporting enough to take a few well-considered chances ourselves? □

MICRO-MINDER

Continued from page 13

portant note must be mentioned at this point when entering your dates:

1. Month must be only the first three letters of that month
2. Enter dates from 1 to 31 (no leading zero)
3. Names should be no longer than 15 characters
4. All months and dates must be entered in chronological order (Jan 1, Jan 15, Feb 1, etc.)

In order to use the second choice "Delete App'ts", you must first use #3 "List App'ts" and get the number of the appointment you wish to delete. #3 will do exactly what it says: list all your appointments on the screen. I find #4, checking appointments, the most fun. Press #4 and the program will ask which month you want to check. Type in Jan to Dec (depending on where your appointments are) and the program will display the actual calendar for the month specified along with a red asterisk to denote an app't on that date. The bottom of the screen will show who the appointment is with. Press the space bar and it will run through all your appointments for that month one at a time, or press "fl" to return to the main menu.

When you're finished adding, deleting, or checking your appointments, you must finish with #5, "Terminate Session." This choice will write the updated file to the disk and then end the program.

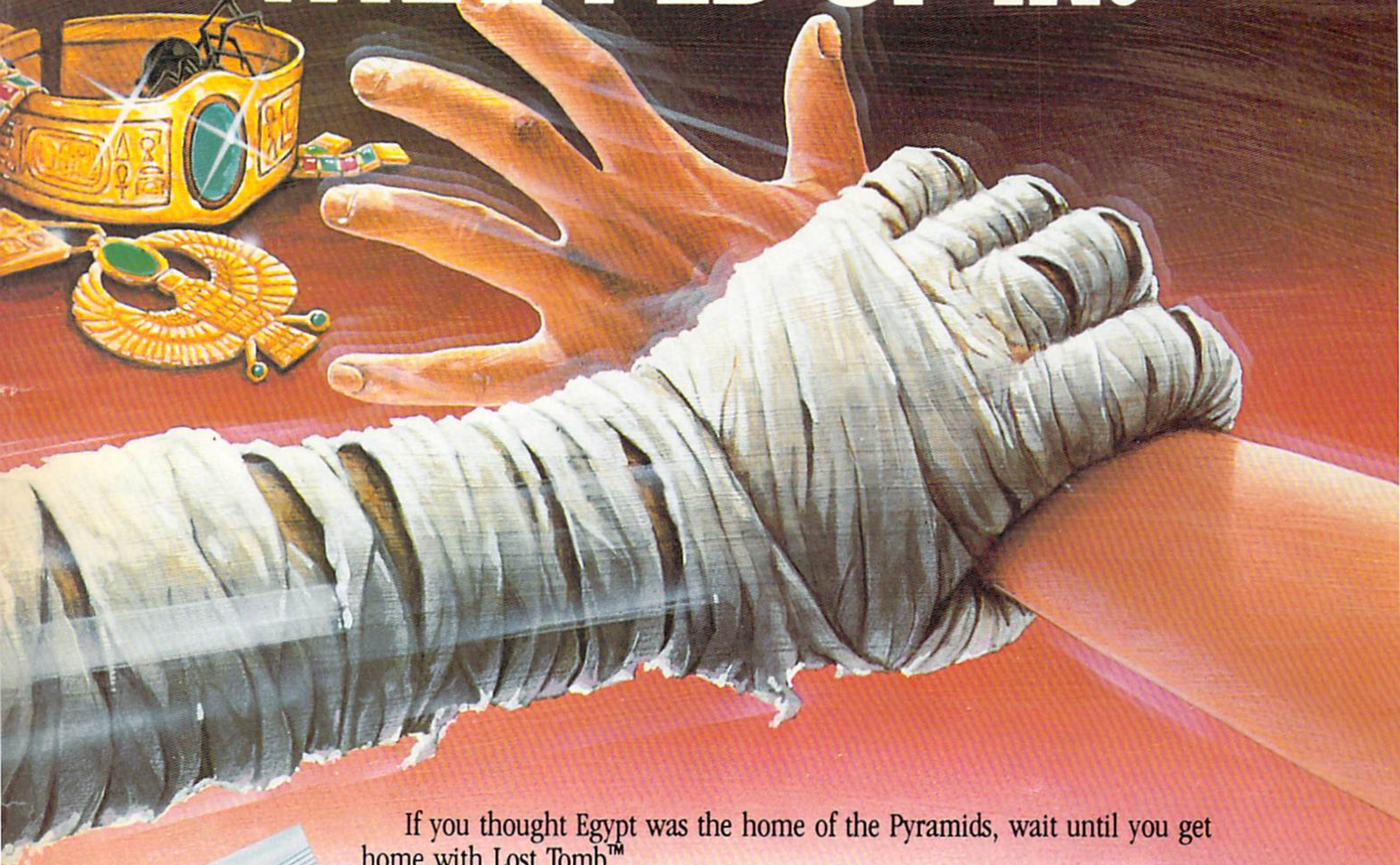
We hope you have as much fun using this program as we had writing it. If you'd like to avoid the "fun" of typing it in, send $5.00 with a stamped, self-addressed envelope to:

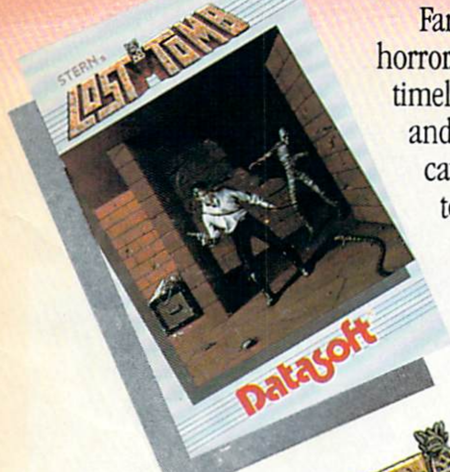
Bob Lloret
157 Atlantic Avenue
Staten Island, NY 10304

A copy will promptly be mailed to you on disk. □

SEE PROGRAM LISTING ON PAGE 70

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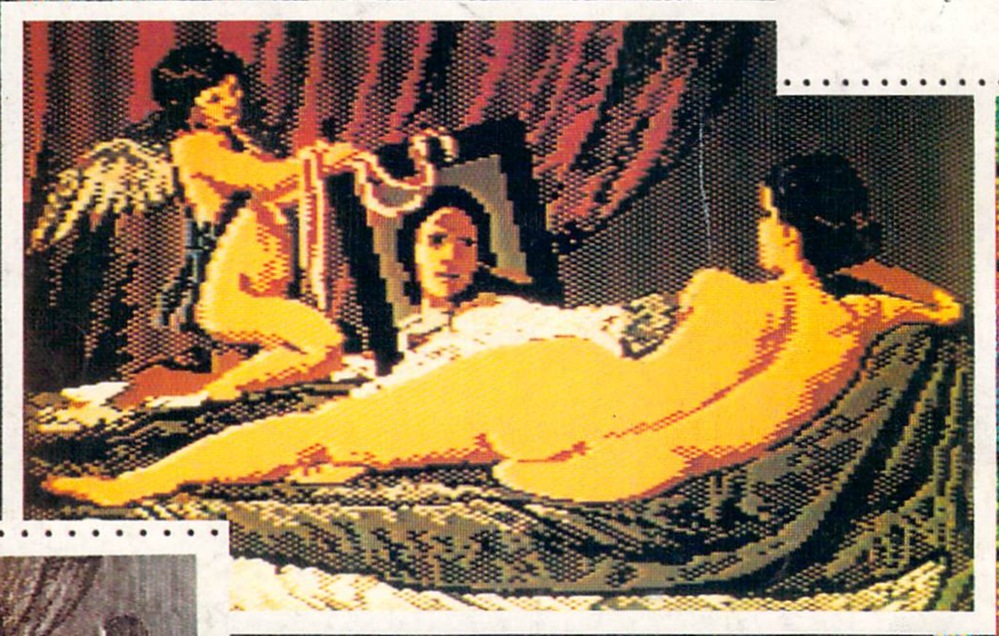
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